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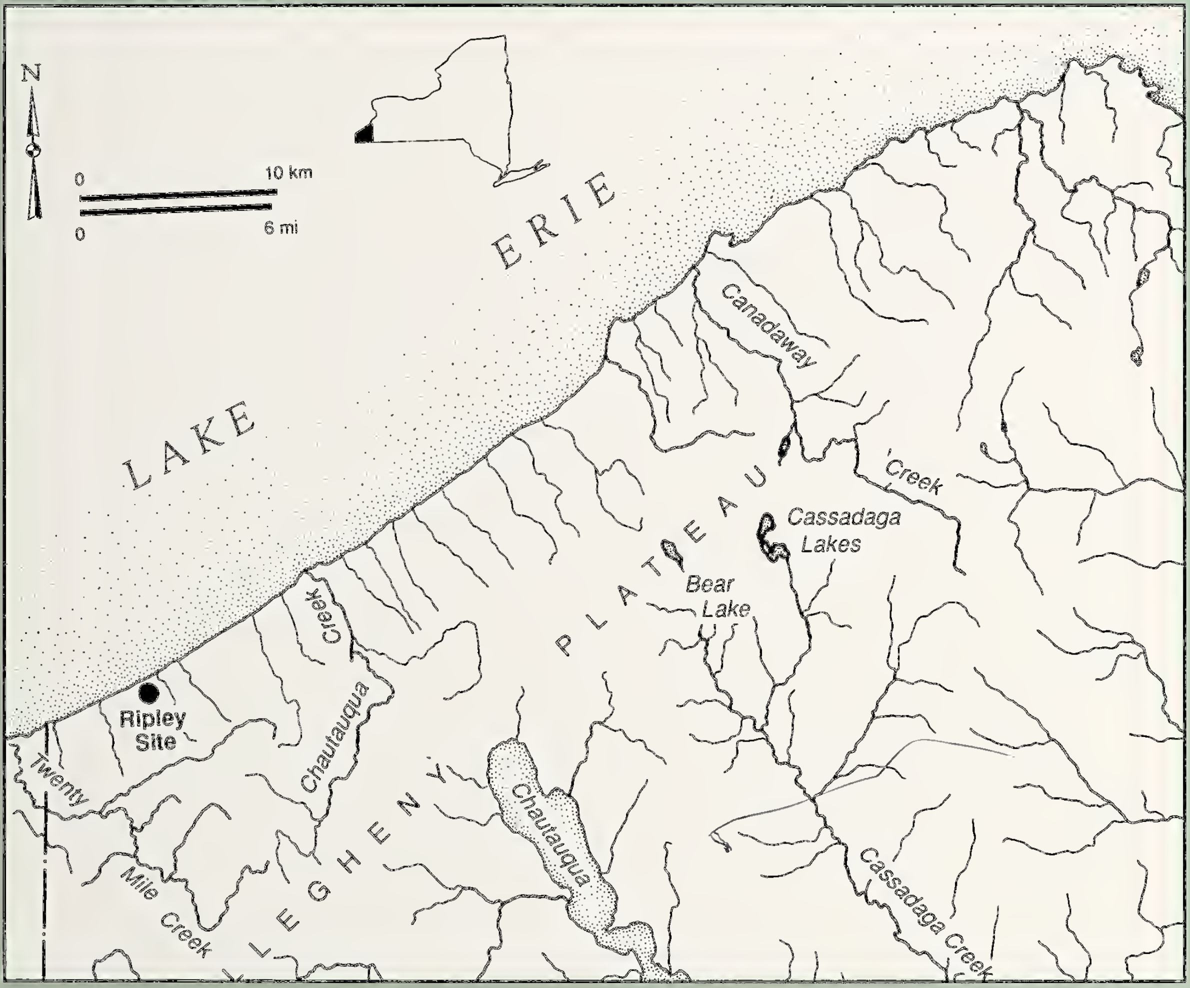
Reanalyzing the Ripley Site: Earthworks and Late Prehistory on the Lake Erie Plain

Edited by Lynne P. Sullivan



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REANALYZING THE RIPLEY SITE

REANALYZING THE RIPLEY SITE: EARTHWORKS AND LATE PREHISTORY ON THE LAKE ERIE PLAIN

Edited by
Lynne P. Sullivan
New York State Museum

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In Memoriam
Virginia R. Barnes

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PREFACE

The studies presented in this volume demonstrate the potential for older museum collections to yield significant data for modern research questions, and they illustrate the kinds of biases inherent in collections that were made using antiquated or amateur excavation techniques. The authors hope that the merits of their research will be judged not only as contributions toward knowledge of an important site in an area that archaeologically is not well understood, but also as approaches for integrating less-than-ideal data into the modern realm of controlled samples and scientific methodology.

Archaeological collections made using past research paradigms and older field techniques, or those made by amateurs and collectors, offer challenges for present researchers, both as resources for new interpretations and as stimuli for creative problem-solving. The positive nature of these challenges, however, must be cast alongside the frustrations in working with unsystematic collections and the very real and unnecessary data loss resulting from unprofessional excavation techniques.

This latter criticism cannot be directed justly at most older systematic collections made by professional archaeologists. These collections essentially represent the state of the art of the discipline at the time. The advantage of these collections is that biases often are systematic and can be accommodated. Nonetheless, scholars frequently are reluctant to initiate projects using older systematic collections because of problems posed by recovery and recording techniques. Many such collections are biased by recovery strategies that lacked screening and were not as sensitive to vertical and horizontal control as are more modern techniques. Certainly none of these collections includes materials from fine-scale recovery techniques, such as flotation, which now are standard procedures but are relatively recent in development. And, of course, probablistic sampling strategies were not employed in making these collections. Other collection biases, either those peculiar to specific collectors or related to the developmental stages of particular methodologies, also pose problems. For example, many older or amateur collections do not include debitage, and the excavators often focused on certain types of features to the exclusion of others.

Given these problems, it is easy to understand why many present-day researchers shun museum collections in favor of more recent professional collections or make new collections themselves. Nevertheless, unless attempts are made to use such flawed collections, many important sites like the Ripley Site will remain largely unknown to present and future archaeologists.

Numerous individuals assisted with the research and are specifically mentioned in chapter acknowledgments. Four institutions, the Peabody Museum of Archaeology and Ethnology at Harvard University, the Rochester Museum & Science Center, the Marian E. White Museum of the State University of New York at Buffalo, and the New York State Museum, made their Ripley Site collections available for our use. The New York State Museum and Indiana University of Pennsylvania provided the funding and staff time to make the research possible. William Green read chapter drafts and provided numerous helpful comments, and Charles Cobb graciously assisted with the peer review process. Connie Bodner patiently copyedited the manuscript and made our inconsistencies consistent. We struggled with the issue of metric and English measurements and decided to use the system used in the cited source. Thus, elevations cited from USGS maps are noted in feet as are the measurements from older excavations that were done using the English system. Our own work however, is reported using the metric system. The production of this volume could not have been accomplished without word-processing assistance from Sue Seney. Brian Sullivan, Patricia Miller, and Chris Supkis assisted with production of the figures and photographs. Janice Kissick of the NYSM's design and production staff made volume design and production possible. Any errors or misinterpretations of the archaeological data are, of course, the responsibility of the authors.

L.P.S.

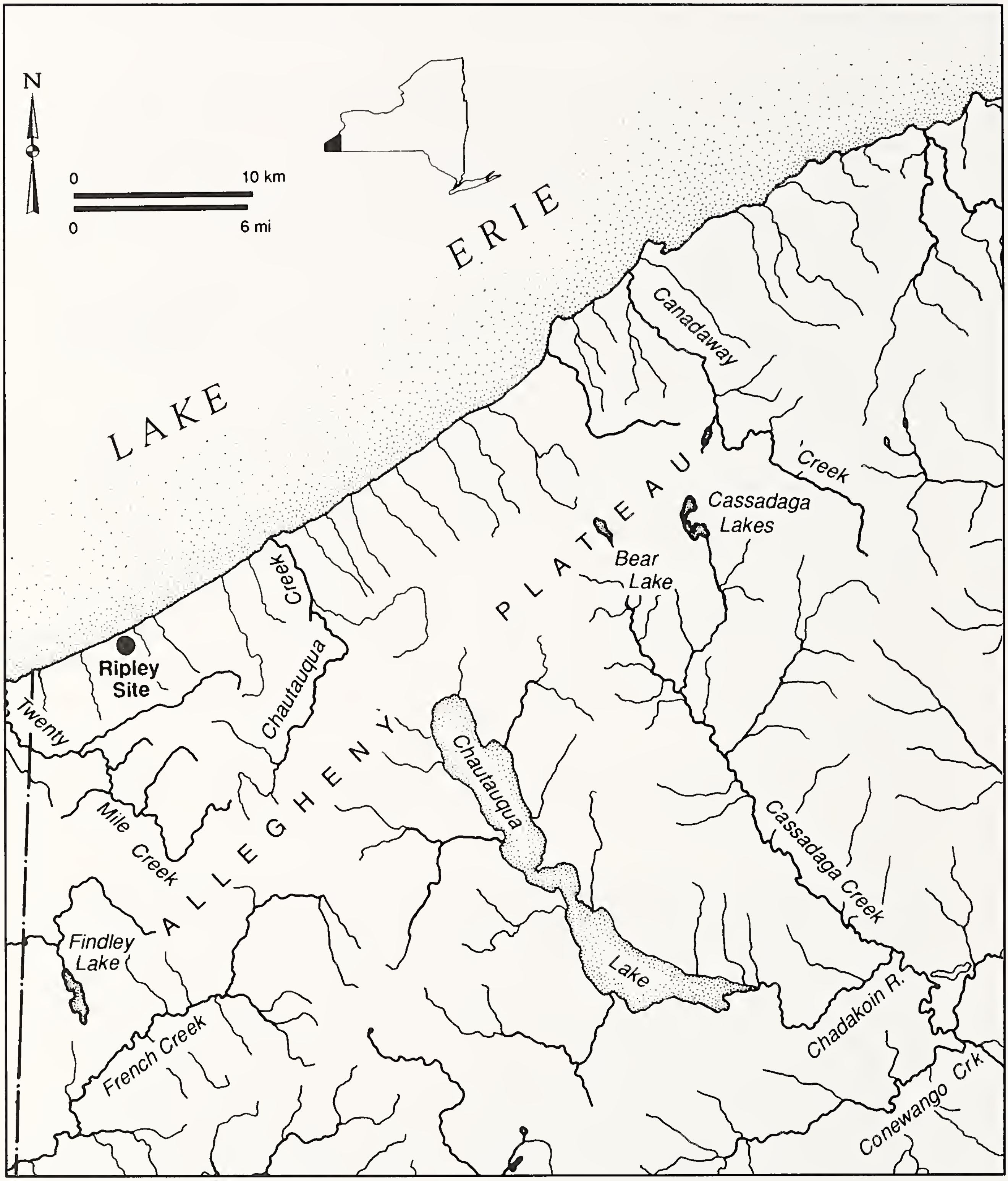

Figure 1.1 Location of the Ripley Site.

CHAPTER 1

THE RIPLEY ARCHAEOLOGICAL PROJECT

Lynne P. Sullivan

The Ripley Site (NYSM 2490), also known as Dewey's Knoll, is on the bluffs above Lake Erie in Chautauqua County, New York, near the present town of Ripley (Figure 1.1). A circular or crescent-shaped earthwork once stood on the site, but it was leveled in the nineteenth century (see Chapter 4). The Ripley Site has served as the focus of archaeological investigations of varying intensity and quality since at least the mid-nineteenth century. The site's rather dramatic bluff-top setting (Figure 1.2), combined with plentiful artifacts and sandy, easily excavated soil, are undoubtedly factors in its archaeological popularity.

Despite the numerous investigations at the Ripley Site by both professional and avocational archaeologists, only two reports of investigations, that of Arthur C. Parker (1907, 1922)[1] and a report of one season of avocational investigations by Conklin (1989), have been published. Not surprisingly, Parker's report, entitled *Excavations in an Erie Indian Village and Burial Site at Ripley, Chautauqua Co., N.Y.*, has stood as the major reference and interpretation for the Ripley Site. Parker believed the Ripley Site was a fortified village and cemetery complex of the Erie tribe and dated to the late sixteenth or early seventeenth century. His assertions were based on the presence of a few European trade items found as funerary objects and on information drawn from ethnohistoric accounts and maps locating the Erie along the southern shore of Lake Erie. The southeastern shore of Lake Erie continues to be considered by many scholars as the homeland of the Erie, although as explained in Chapter 2, information about the Erie is scant. Parker's interpretation of the Ripley Site has not been reexamined, even though there have been major changes in archaeological theories, methods, and techniques over the ensuing nine decades.

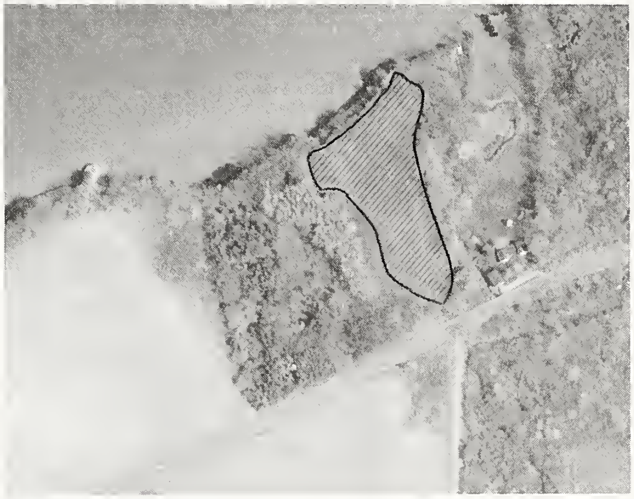

Figure 1.2 View of the Ripley Site. The approximate site area is shaded. (Photo by Kucera International, Inc.)

THE RIPLEY ARCHAEOLOGICAL PROJECT

This volume is the first of two publications reporting Ripley Site investigations that were undertaken as a collaborative venture, known as the Ripley Archaeological Project (RAP), by the New York State Museum (NYSM) and Indiana University of Pennsylvania (IUP). Phillip Neusius (IUP), Sarah Neusius (IUP), and Lynne P. Sullivan (NYSM) served as the project's co-principal investigators. The chapters in this volume present information from the previous, unreported excavations and report the results of several exploratory analyses of the older collections. The second, forthcoming volume describes excavations of the site directed by the principal investigators in 1988, 1990, and 1992, and the results of analyses based on data derived from those investigations. The forthcoming publication also includes specialist studies of categories of materials not discussed fully in this volume, including the European trade items and a stylistic study of all the complete ceramic vessels.

The major goal of the RAP is to develop refined models of late prehistoric and protohistoric cultural dynamics for the Chautauqua/Allegheny portion of the Lake Erie Basin. Investigations of the Ripley Site are integral to this larger goal because of the lack of scrutiny of Parker's nearly century-old work and the general dearth of modern, in-depth studies of sites dating to these time periods in this region. As reported in this volume, the results of the first phase of this project are a synthesis of information about the Ripley Site and its cultural and environmental contexts; new hypotheses for guiding continued research that were generated through examination of the existing information and collections; and identification of gaps in the available data. This work laid the foundation for the project's second phase, which included new excavations of the site. These excavations were designed to collect information unavailable from the extant collections, yet necessary for addressing the new research questions.

---

[1] The 1922 publication essentially duplicates that of 1907.

Analysis of the extant collections from the Ripley Site posed a number of challenges. Not the least of these was locating the materials. Collections from the Ripley Site exist in three states, at least four museums, and numerous private homes. These materials exemplify the full range of possible fates for archaeological collections–from the worst case scenario of looted artifacts that entered the antiquities market to professionally excavated collections that have received good curatorial care from a professional institution.

"Reexcavation" of such museum and amateur collections is invariably an interesting process, although the rewards are not always entirely predictable. This uncertainty is typical of cases like the Ripley Site, where a composite of materials collected by several individuals, who varied considerably in their training and interests, must be used as a database. As Richard Wilkinson aptly states in Chapter 8, the Ripley data must be viewed through a series of filters, including curatorial care as well as excavation and recording techniques. Such filters demand constant reassessment of the prospects of addressing specific research questions, and they necessitate rigor in interpreting results. The analyst can never lose sight of the possibility that collection-formation processes, rather than site-formation processes, and post-excavation activities, rather than aboriginal activities, were instrumental in creating observed patterns in the data.

Despite such problems, analyses of the older collections did provide effective direction for continued research. Three broad themes initially guided the analyses: (1) relationships of the population that once inhabited the Ripley Site with the natural environment; (2) societal organization; and (3) relationships of this society to Iroquoian societies, especially those of the nearby League of the Iroquois. As the work progressed, the investigators realized that these themes needed to be revised to include questions about the nature of the Ripley Site itself. This situation arose because some of the data did not corroborate Parker's interpretation. Delineating the types of activities represented at the site, defining differences between the "village" and "cemetery" areas as defined by Parker, and determining overall site function became critical issues for investigation.

The chapters in this volume thus present data that led the RAP to formulate a new proposal for the function of the Ripley Site. Several of the studies raise significant challenges to Parker's interpretation of the site as primarily residential in function. The available data instead suggest that the main purpose of the Ripley Site was related to mortuary activities.

VOLUME ORGANIZATION

Chapters 2, 3, and 4 provide background and descriptive information for the analytical chapters, including overviews of the cultural and environmental contexts and a history of investigations of the Ripley Site. Each of the subsequent five chapters focuses upon a specific category of data. The particular collections forming the database for each study vary, depending upon the nature and accessibility of materials and required sample size.

All five analyses reexamine the Parker collections because these are the largest collections from the site, and being in the holdings of the New York State Museum, they were the most readily accessible. Several of the studies also incorporate materials from other excavations because a larger or more comprehensive sample was needed than what could be obtained from the Parker data alone. This is especially true in the case of the two studies of burial data (Chapters 8 and 9).

Chapters 5 through 7 examine manufactured objects and technological and/or subsistence byproducts, including ceramics, chipped stone and bone implements, and refuse bone. The major focus of Engelbrecht's analysis of pottery attributes (Chapter 5) is the theme of interregional relationships, but he also notes some variation between ceramics in two collections (those of Parker and Conklin) that may relate to functional differences and signal possible activity-area differentiation within the site. Phillip Neusius's study of the chipped stone materials in the Parker collection raises serious challenges to Parker's interpretation of the Ripley Site as primarily residential in function. Neusius finds little evidence in the lithic tool assemblage for the range of activities that would be expected at a village site. Sarah Neusius's examination of Parker's collection of faunal refuse bone and bone artifacts raises questions concerning strategies used for faunal resource procurement as well as the nature of the activities conducted at the site. The refuse bone suggests that a garden hunting strategy, commonly used by horticulturalists, was not employed by the Ripley Site inhabitants. The composition of the bone artifact assemblage suggests issues about site function similar to those raised by the analysis of the chipped stone tools.

The two chapters using burial data (Chapters 8 and 9) also question aspects of Parker's interpretation. Wilkinson's study of the burial population indicates that the number of burials at the site is larger than would be expected if estimates for life expectancy and length of occupancy for Seneca villages are used, and in fact, suggests a population size larger than what could have been accommodated by the size of the site. He also demonstrates the relatively good health of the population, as indicated by infrequency of chronic disease and malnutrition, and notes several gender-based distinctions in the mortuary sample. The social dimensions of mortuary practices are the focus of Sullivan and Coffin's study, but this work also finds problems with Parker's interpretation of the site. Compilation of the existing information on burial locations shows that burials occur in most site areas, not in a spatially segregated cemetery as Parker thought. This chapter also makes comparisons with mortuary practices of the early historic Seneca.

The final chapter examines and integrates the results of these analyses and poses a framework for continuing research. Thus, the end product is not only a comprehensive overview of the present information, but also a research design for addressing the problem of the function and regional context of the Ripley Site.

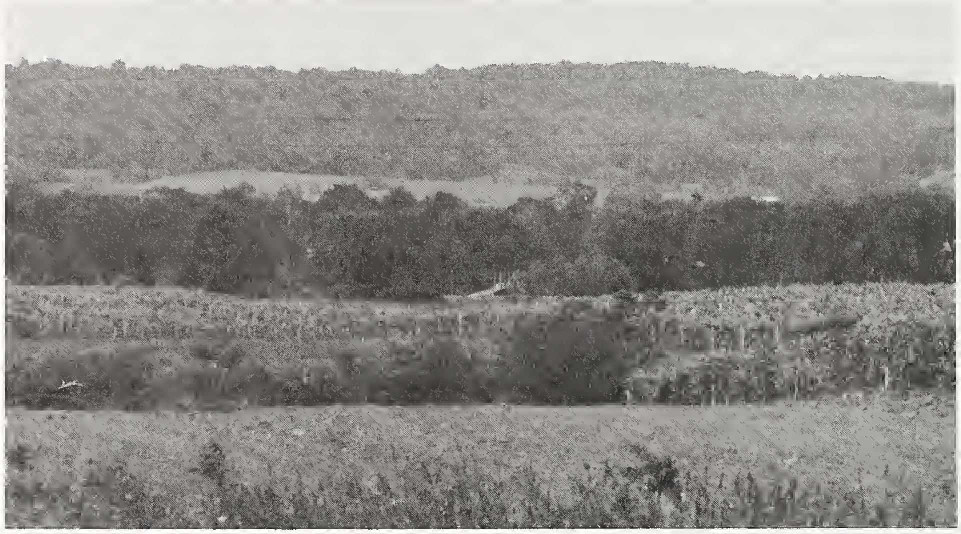

Figure 2.1 View of the Allegheny Plateau from the lake plain. Chautauqua County, New York. Note vineyards on the lake plain.

CHAPTER 2

ENVIRONMENTAL CONTEXT

Sarah W. Neusius

Arthur Parker's interest in the environmental setting of the Ripley Site was minimal. In his day, archaeologists were interested in cultural materials and saw little reason to investigate how these materials reflected human-environment interactions. Ripley Archaeological Project (RAP) researchers have approached the reanalysis of the Ripley Site from a very different perspective. Mindful of the popular definition of culture as an adaptive mechanism, we have identified an understanding of the interrelationships between Ripley's inhabitants and the natural environment as a primary goal. In a sense, we are interested in the human ecology of the Ripley Site. This involves more than a static reconstruction of the natural environment, but environmental reconstruction is basic to the undertaking. Hence, part of the initial work has been to gather available information about the environmental context within which the Ripley system operated.

This chapter contains a summary of the environmental information that has been collected as part of RAP's recent research. It does not include a detailed reconstruction of local environments and resource distributions. Instead, the purpose of this chapter is to present enough environmental information to allow the reader to place the various databases subsequently discussed into an adaptive context. To this end, physical features, climate, soils, vegetation, paleoenvironmental change, and animal resource distributions are considered here. This information should provide a meaningful perspective on the reanalysis of the Ripley Site collections.

PHYSICAL FEATURES

The dominant physiographic element in the vicinity of the Ripley Site is the contrast between the Erie Lowland and the Allegheny Plateau (Figure 2.1). Differences between these zones in elevation, relief, bedrock, and geologic history are reflected in soils, temperatures, precipitation, vegetation, and faunal distributions. As a result, this physiographic contrast is an important aspect of the Ripley Site's environmental context.

The Erie Lowland is a narrow strip of land along the Lake Erie shore. It is only about 3.2 km wide at the Pennsylvania border, but it expands in width to the northeast so that it is over 6.4 km wide (Muller 1963:10; Tesmer 1963:2) at the eastern edge of Chautauqua County and up to 24 km wide in Erie County, New York (Miller 1973:4). Fenneman (1938) referred to the Erie Lowland as part of the Great Lakes Section of the Central Lowlands Province. The Portage Escarpment marks a sharp contrast in elevation and relief at the juncture of the Erie Lowland with the Allegheny Plateau, which rises to the south and east. The Allegheny Plateau in Chautauqua County is part of the Glaciated Allegheny Plateau Section of the Appalachian Plateau identified by Fenneman (1938), except for the southeast corner of the county, which is considered part of the Unglaciated Allegheny Plateau Section.

The bedrock underlying these two physiographic zones is predominantly Upper Devonian in age and sedimentary in character (Tesmer 1963). Because of the southward dip of the beds in this area, older materials are successively exposed moving from south to north. Both Beckerman (1981) and Hough

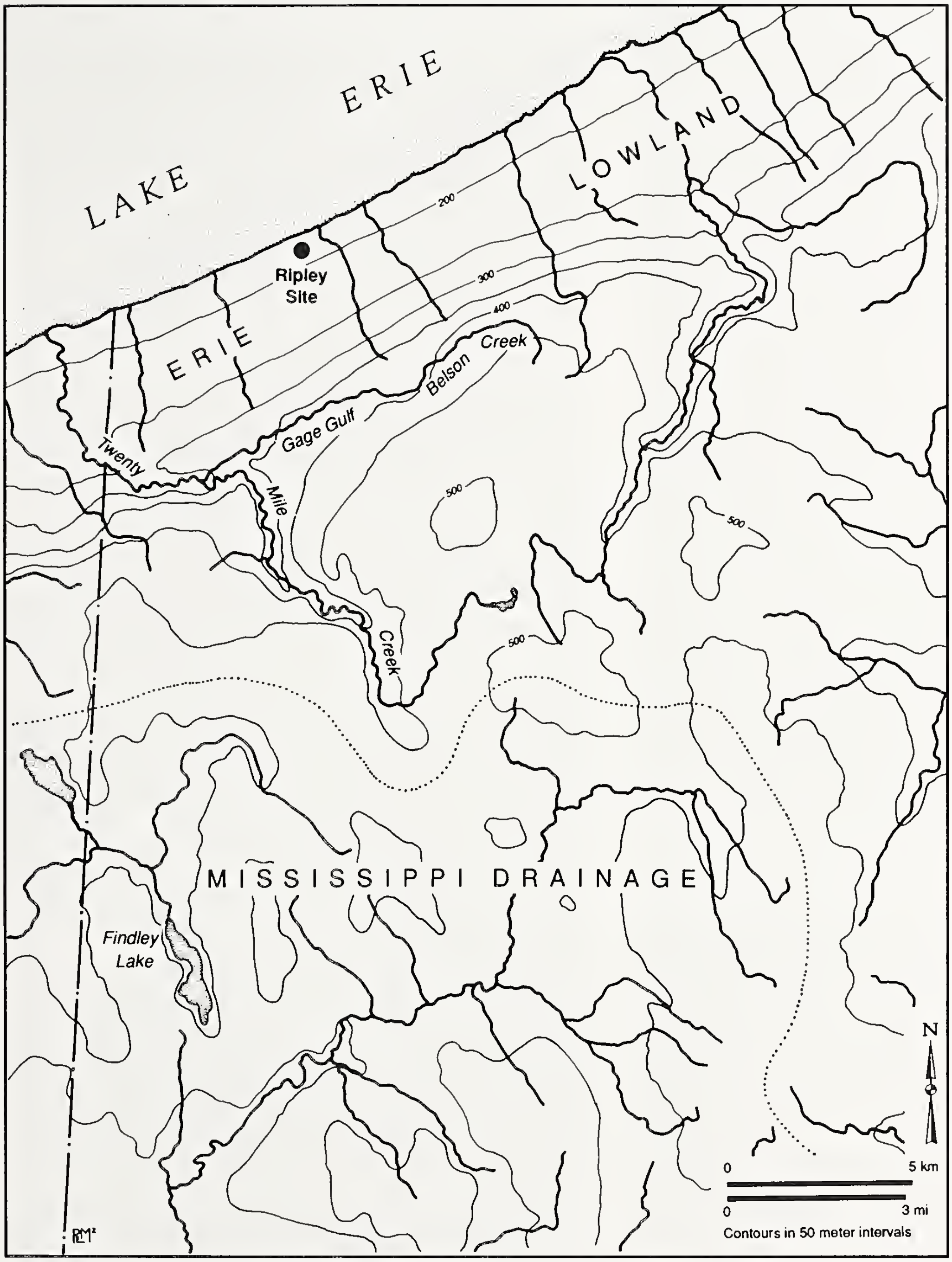

Figure 2.2
Physiographic features of southwestern New York.

(1958) attributed the elevational contrast between the Erie Lowland and the Allegheny Plateau to differences in the resistance of the various bedrock strata. These authors also indicated that within the Lake Erie Basin in general, the older Devonian shales underlie the Erie Lowland and Lake Erie itself, while Mississippian and Pennsylvanian sandstones underlie the Allegheny Plateau. Tesmer's (1963) more detailed study of Chautauqua County indicated that Mississippian rock strata are of only minor significance and Pennsylvanian strata are non-existent. The Knapp Formation, consisting of conglomerates of Mississippian age, is exposed on the highest hills at the southeastern corner of the county, but it is certainly unimportant to understanding the bedrock strata in the vicinity of the Ripley Site at the opposite corner of the county.

Upper Devonian strata underlie the Erie Lowland in the vicinity of the Ripley Site. The site itself is directly underlain by the Westfield shale and the Shumla siltstone, which are both members of the Canadaway Formation of the Chautauquan Series. However, the Northeast shale member of this formation underlies most of the Erie Lowland and the Portage Escarpment in this part of the county. Dexterville siltstone and Ellicott shale of the Chadakoin Formation of the Chautauquan Series underlie the plateau immediately south of the escarpment and along major north-flowing streams. Surficial, unconsolidated deposits of Quaternary origin occur as one proceeds south from the escarpment (Tesmer 1963:Plate 5).

All of the Allegheny Plateau in New York State was glaciated except a portion of southeastern Chautauqua, southern Cattaraugus, and southwestern Allegany counties. Although the distinction between the glaciated and unglaciated Allegheny Plateau is important physiographically, it is of less significance to the environmental context of the Ripley Site than the more proximal contrast between the Erie Lowland and the glaciated Allegheny Plateau.

Glacial processes are responsible for many of the landforms in southwestern New York State (Figure 2.2). A series of moraines with the oldest to the south mark the retreat or readvance of the Wisconsin ice margin (Miller 1973:7). In Chautauqua County, these include the Kent, Clymer, Findley, Lavery, Defiance, and Lake Escarpment moraines (Miller 1973; Muller 1963:39-48). The latter three of these moraines are found close to the juncture of the Allegheny Plateau and the Erie Lowland and are thus most proximal to the Ripley Site. Muller (1963, especially Plate 1) considered these moraines to be Late Cary in age.

Glacial through valleys or troughs also are notable in Chautauqua County. The three most significant troughs are southeast-trending valleys scoured during the Pleistocene. Today Chautauqua Lake, Chadakoin Creek, Cassadaga Creek, and Conewango Creek are found in these valleys (see Figure 1.1). South of the Ripley Site the upland topography trends south-southeastward, but it is crossed by west-southwest-flowing creeks, which are confined by the recessional moraines in this part of the county. French and Brokenstraw creeks drain this area by flowing between the Finley and Clymer moraines (Muller 1963:12-13).

In the Erie Lowland, glacial lake stages are indicated by the existence of sand and gravel beach deposits inland from the modern lake shore at higher elevations. Both glacial Lake Whittlesey and glacial Lake Warren beaches are apparent in southwestern New York State. Other lacustrine sediments cover most of the lowland (Muller 1963:Plate 1).

The modern margin of Lake Erie is marked by a wave-cut cliff, which is subject to erosion. At times large sections of this cliff erode away at once. Since the Ripley Site is situated immediately adjacent to Lake Erie on the top of this cliff, one of RAP's major concerns has been the extent to which the site has eroded into the lake. While Parker (1907:478) estimated that from 6 to 12 in of the cliff face were lost each year, he presented no concrete evidence for this claim. Based on the portion of the site which remains and a preliminary review of aerial photographs of this portion of the Lake Erie shoreline taken in 1956 and 1979, this erosional rate is too rapid. Beckerman (1981:26-32) summarized information on Lake Erie shoreline erosion and noted a reduction in the rate of recession for Lake County, Ohio, after 1937. He also noted increasing variability in the rate of erosion after this time. Until further study of shoreline erosion in Chautauqua County can be done, it is most reasonable to assume that periodic, extremely rapid erosion can and does occur in the vicinity of the Ripley Site. Changes in rate are dependent on climatic, topographic, and other variables.

Lake Erie itself is the shallowest of the Great Lakes with a maximum depth of only 64 m. Most of Lake Erie is even shallower than this with the western end having a lake floor only 8-10 m deep. The Ripley Site is adjacent to the relatively deep eastern basin of Lake Erie, which was formed by erosion of the soft Devonian shales beneath this basin (Hough 1958:27).

Despite the proximity of Lake Erie, most of Chautauqua County is actually within the

Allegheny drainage system and is thus within the Mississippi, rather than the Great Lakes, watershed. The divide between these two watersheds is located only a few kilometers from the Ripley Site on the Allegheny Plateau (Figure 2.2). There are only a few streams flowing northward into Lake Erie. The most significant of these in the Ripley area is Twenty-mile Creek, which flows into Lake Erie across the Pennsylvania line. Like Chautauqua and Canadaway creeks to the east, this creek begins on the plateau, breaches the moraine complex at the escarpment, and flows through a deeply incised gorge or gulf exposing fossiliferous rocks (Muller 1963:12).

The drainages of the Allegheny basin are somewhat better developed although more peripheral to the Ripley Site. As mentioned in the discussion of glacial features, these include French and Brokenstraw creeks in the southwestern part of the county, Chautauqua Lake and its outlet Chadakoin Creek, and Cassadaga and Conewango creeks in the glacial through valleys southeast of Ripley.

CLIMATE

The climate of southwestern New York State can generally be characterized as humid continental (Carter 1966; Miller 1973:10), but there are significant differences in climate between the Erie Lowland and the Allegheny Plateau. Carter (1966:72-77) included the Erie Lowland in that part of New York State which has cold, snowy winters and warm, dry summers, while he characterized the Allegheny Plateau as having cold, snowy winters and cool, wet summers.

Besides local topography, the factors of latitude, seasonal frequencies of air masses and atmospheric disturbances, continentality, and the location of the Great Lakes influence the climate of southwestern New York (Beckerman 1981:33; Eichenlaub 1979:196). The latitude assures that there are marked summer-winter contrasts in solar radiation. The position of the jet stream north of the Great Lakes in the summer and south of the Great Lakes during the winter leads to the relatively high frequency of atmospheric disturbances. Its position is also reflected in the presence of mostly Pacific air masses in the winter and primarily Pacific or Gulf of Mexico air masses in the summer. Continentality is related to the tendency of large land masses to heat or cool at more rapid rates than bodies of water. In the interior of North America, this leads to large temperature contrasts between summer and winter. Like the other Great Lakes, Lake Erie has an ameliorative effect on continentality and hence on temperature extremes (Eichenlaub 1979:196-204).

The influence of Lake Erie is felt most strongly in the Erie Lowland. Miller (1973) indicated that the average annual temperature in the Erie Lowland is 2 to 3 degrees Fahrenheit (°F) higher than that on the plateau. For example, the mean annual temperature at Fredonia, at an elevation of 750 ft in the Erie Lowland, is 48.6°F, while that at Volusia at 1560 ft in elevation on the plateau is 45.6°F, and that at Jamestown at an elevation of 1390 ft on the plateau in southern Chautauqua County is 47.6°F. Both summer and winter temperatures are lower on the average in the plateau than in the Erie Lowland. For example, Fredonia has a mean January temperature of 27.6°F and a mean July temperature of 71.3°F, while Volusia and Jamestown have mean January temperatures of 23.4°F and 25.3°F, respectively, and mean July temperatures of 68.4°F and 70.0°F, respectively (Miller 1973:10-11).

The Erie Lowland/Allegheny Plateau contrast is reflected in the length of the frost-free period as well. This environmental variable may have been particularly important to late prehistoric horticulturalists. The average frost-free period is significantly longer in the Erie Lowland than in the plateau. For example, Fredonia has an average frost-free period of 172 days, while Volusia has only 135 days free of frost, and Jamestown has 145 frost-free days (Miller 1973:11).

Precipitation is also affected by the contrast in physiographic zones. Mean annual precipitation generally is lower in the Erie Lowland than on the Allegheny Plateau. For example, Fredonia's mean annual precipitation is approximately 36.72 in (Miller 1973:11, but see Carter 1966:69), while the mean annual precipitation in Jamestown is 43.83 in (Miller 1973:11). Most of this precipitation does not come during the growing season in either area.

SOILS

There is considerable variation in the soils of southwestern New York as a result of variations in parent material, terrain, climate, drainage, and natural vegetation (Cline 1955; Feuer et al. 1955; Morrison et al. 1916). The soils in this area are relatively young so that parent material is still the most critical variable. With respect to soil provinces, these soils are podzolic forest soils (Braun 1950:24-25; Miller 1973:9-10).

Soils in the Erie Lowland were placed by De Laubenfels (1966, especially Figure 33) into his Soil Region II. This region encompasses large portions of the Erie-Ontario Lowlands, the Hudson Valley, and the St. Lawrence Valley in New York State. This region has limy soils formed on glacial lake sediments and lying over level or undulating terrain. These soils are medium- to fine-textured and less rocky and limy than soils formed on glacial till immediately to the south and east.

The escarpment of the Allegheny Plateau marks the transition to soils formed on glacial till. De Laubenfels (1966a, Figure 33) mapped two such soil regions as extending into Chautauqua County. Region I occurs in a narrow band on the northern edge of the plateau east of the Ripley Site. This region contains soils which are limy and formed on glacial till. Miller (1973:10) pointed out that these soils occur in areas where the limestone and dolomite parent material of the Erie-Ontario Lowlands was distributed southward by the glaciers. Most of the Allegheny Plateau in Chautauqua County is in De Laubenfel's Region IV, where deep acid soils formed on glacial till over hilly terrain are found.

Detailed soil maps of Chautauqua County have been prepared several times (Feuer 1955; Morrison et al. 1916). A new map by the Soil Conservation Service recently has been completed. One future project for RAP is the incorporation of this new information into environmental reconstructions.

VEGETATION

Plant and animal distributions in the vicinity of the Ripley Site are structured by the physiographic and climatic variables discussed above. The natural vegetation of the entire area was forest, although much of the area has been cleared or lumbered. Contrasts between the forests of the Erie Lowland and those of the Allegheny Plateau have always been significant to the area.

The Erie Lowland of southwestern New York State is part of the Beech-Maple Forest Region, which delineates glaciated areas surrounding the southern Great Lakes (Braun 1950; Miller 1973). The dominant trees in this forest type are beech (*Fagus grandifolia*) and sugar maple (*Acer saccharum*), but other species also characterize this forest. Basswood (*Tilia americana*) is a frequent co-dominant, and white elm (*Ulmus americana*), white ash (*Fraxinus americana*), red maple (*Acer rubrum*), black maple (*Acer nigrum*), red oak (*Quercus rubra*), shagbark hickory (*Carya ovata*), black cherry (*Prunus serotina*), and yellow poplar (*Liriodendron tulipifera*) also occur commonly within this forest. Thus, the climax vegetation expected in the Erie Lowland is a deciduous beech-maple forest.

The presence of some oak (*Quercus* spp.) and chestnut (*Castanea dentata*) in the area's forests has led several authors to suggest possible historical affinities of this forest with the Oak-Chestnut Forest Region of the eastern United States (e.g., Braun 1950:321; Miller 1973:16). In addition, a prairie vegetational element is represented by widely dispersed grassland species throughout the Erie-Ontario Lowlands of New York State. Miller (1973:12-13) concluded that there were prairie-like openings within the forests of the lowlands at the time of European contact. Gordon (1940:72-73) appeared to concur. Moreover, he believed that such openings could be considered remnants of the migration of prairie species during the Xerothermic climatic interval in the Mid-Holocene (see also Miller 1973:76). Other authors (Day 1953) undoubtedly would consider aboriginal agriculture and village placement as factors in the presence of forest openings.

In reconstructing the vegetational surroundings of the Ripley Site, we must envision a deciduous beech-maple forest broken by meadow openings. In addition, relatively minor variations in topography, soils, and aspect can be expected to have led to the presence of other forest types. Reconstructions of the original forests of Monroe County, New York, located in the Ontario Lowland suggest the probable character of such variation. As reported in Miller (1973:16-17), probably only 61 percent of the cover was beech-sugar maple forest, while a hemlock-northern hardwood forest type was found in sheltered ravines, an oak-chestnut-pine type of forest covered dry, sandy areas, and an upland oak-hickory forest grew on glacial features and dry, gravelly soils. Swamp forest, mixed mesophytic forest, and bog forest were also probably present in small areas. This information indicates how complex the reconstruction of vegetational cover in the vicinity of the Ripley Site may prove to be.

The forest type characteristic of the glaciated Allegheny Plateau in southwestern New York State was termed the Hemlock-White Pine-Northern Hardwoods Forest by Braun (1950). The Northern Appalachian Highland Division of this forest stretches from northern Pennsylvania into New York State and then throughout New England into the Maritime Provinces of Canada (Braun 1950:330-340). Although clearing and lumbering have been extensive in the Allegheny Plateau of southwestern New York, remnant virgin forests in adjacent northwestern Pennsylvania provide an indication of the character of the natural forest here.

This forest is a mixed coniferous-deciduous forest in which hemlock (*Tsuga canadensis*) and beech (*Fagus grandifolia*) dominate the canopy on the middle and lower slopes and on the plateau tops. Either yellow birch (*Betula alleghaniensis*) or sugar maple (*Acer saccharum*) are third in importance, depending on whether the stand is on the middle and lower slopes or on the plateau tops, respectively. A beech-sugar maple subtype which lacked the hemlock was originally found on the better-drained soils near the ridge tops (Gordon 1940:38; Miller 1973:18). Other tree species associated with this forest type are red maple (*Acer rubrum*), black cherry (*Prunus serotina*), white ash (*Fraxinus americana*), yellow poplar (*Liriodendron tulipifera*), cucumber tree (*Magnolia acuminata*), and basswood (*Tilia americana*) (Miller 1973:18).

Gordon (1940:35) believed that where white pine (*Pinus strobus*) is found within this forest today, it can be taken as an indication of past disturbance and ecological immaturity. However, he also noted that Holland Land Company surveyors found secondary growth in the late eighteenth century so that pre-Euro-American clearing and disturbance must be anticipated (Gordon 1940:12, 15).

PALEOENVIRONMENTAL CHANGE

Since the late prehistoric and the protohistoric periods in which RAP is interested did not occur particularly long ago, it is not necessary to consider the major changes in environmental character which the area experienced during the early part of the Holocene. Nevertheless, less drastic climatic change may have occurred during the last 1,000 or so years. The potential impact of these climatic fluctuations on horticulturally based economies cannot be overlooked (Hunt 1989).

One approach to reconstruction of the climate of the last 1,000 or so years has been to assume climatic episodes that are more or less synchronous with climatic events elsewhere in the world. For example, it generally is assumed that there was a period of cooler climate beginning around A.D. 1500 and extending to approximately A.D. 1880 throughout Europe and North America (e.g., Grove 1979). This kind of approach has led to the recognition of four climatic episodes (e.g., Cleland 1966:31-36; Hunt 1989). The first is the Neo-Atlantic (A.D. 800-1250), when conditions were warmer and moister, and southern fauna moved into the area. The second is Pacific I (A.D. 1250-1450), during which it was drier and cooler. Pacific II (A.D. 1450-1550) was again warmer and moister, and southern fauna were favored as during the Neo-Atlantic. Finally, the Neo-Boreal Climatic Episode (A.D. 1550-1880) was a time of cool climate, the severity of which is suggested by the nickname "Little Ice Age."

Palynological data from North America do not unequivocally support the existence of the climatic fluctuations embodied in this sequence, nor is the documentation for this "Little Ice Age" in northeastern North America actually as strong as it is in Europe (Bradley 1985:241; Lamb 1982:230). Wendland and Bryson (1974) did note a climatic transition between warm, moist conditions and drier, cooler conditions about 850 B.P. which they believed marks the Neo-Atlantic-Pacific transition. Miller (1973) postulated that changes in his pollen profiles from southwestern New York State about this time might represent successional changes rather than climatic change. Beckerman (1981:2-76-2-79) has argued that the assumption of worldwide climatic similarity is not supported in the palynological record from the Lake Erie Basin. Instead, he suggested that the entire period after A.D. 800 can be characterized as dry, although probably not as dry as during the earlier Xerothermic.

Since Hunt (1989) argued that climatic fluctuations could be used to model settlement distributions in southwestern New York State, it is important to clarify the nature of climatic change over the last 1,000 years. Specifically, Hunt reasoned that during the cooler periods, settlements should have been concentrated in the Erie Lowland where Lake Erie had an ameliorative effect on the growing season. Other researchers (e.g., Widmer and Webster 1981) have developed similar expectations. Certainly, the Little Ice Age severely restricted the amount of arable land in Europe (Bradley 1985:405-407), and it makes considerable sense that this may have happened in the vicinity of the Ripley Site as well, but until the precise nature of climatic change in southwestern New York State can be clarified and until the dating of the Ripley Site itself is clearer, the relevance of Hunt's model remains uncertain.

ANIMAL RESOURCE DISTRIBUTIONS

Shelford (1963) placed the Ripley Site and its vicinity within the Northern and Upland Region of his Temperate Deciduous Biome, and various surveys of the animals of New York State and adjacent Pennsylvania (e.g., Bull 1985; Burt 1957; Merritt 1987; Smith 1985) have identified the specific taxa found in Chautauqua County. Other studies, such as Beckerman's (1981) work on the resources of the Lake Erie Basin and studies of the biota of the Allegany Indian Reservation in adjacent

Cattaraugus County (Smith 1961; Stewart 1961), are also of interest.

These sources have provided preliminary understanding of the availability and distribution of animal resources in the Ripley area. The following discussion is not intended as an exhaustive treatment of either the presence/absence of taxa or of animal distribution and abundance. Instead, for purposes of establishing environmental context, several broad resource zones are recognized and characterized. Detailed catchment studies for the Ripley Site remain to be undertaken.

The resource zones recognized include both terrestrial and aquatic zones. This is a contrast of possible importance in assessing the human ecology of the Ripley Site, since aquatic resources often have been important sources of food surplus for foragers and subsistence farmers alike.

The terrestrial zones include two forest types. These are the beech-maple forest of the Erie Lowland and the mixed coniferous-deciduous forest of the Allegheny Plateau. Many of the same mammalian species are found in both forest zones. White-tailed deer (*Odocoileus virginianus*), black bear (*Ursus americanus*), wolf (*Canis lupus*), and possibly moose (*Alces alces*) (Hamilton 1963:405) were present prior to European colonization. Some authorities believe that the American elk (*Cervus elaphus*) also occurred throughout the forests of Eastern North America (e.g., Merritt 1987:335-336), but confusion over nomenclature could be behind some of the early reports of elk. Of those large mammals once present in the forests of southwestern New York, only the white-tailed deer and the bear have not been extirpated.

Medium-sized mammals now found in the forest zones include the porcupine (*Erethizon dorsatum*), which prefers the mixed deciduous-coniferous forest of the plateau; the raccoon (*Procyon lotor*), which is highly adaptable in terms of habitat; and the gray fox (*Urocyon cinereoargenteus*), which prefers hardwood forests with abundant brush and rocky terrain (Merritt 1987). The fisher (*Martes pennanti*), which can be found in tracts of hardwood and coniferous forests; the bobcat (*Lynx rufus*), which prefers woodlands with brushy thickets and old fields; and the mountain lion (*Felis concolor*) were once found in the forests of southwestern New York as well. Another important forest mammal would have been the snowshoe or the varying hare (*Lepus americanus*), which was a prey item for a number of the forest predators (Merritt 1987:131-132).

Many of the smaller forest mammals (e.g., *Blarina brevicauda, Peromyscus maniculatus, Peromyscus leucopus, Clethrionomys gapperi, Microtus pinetorum, Napaeozapus insignis*) were probably never of much economic importance. Exceptions may have been members of the squirrel family, such as the eastern chipmunk (*Tamias striatus*), which prefers deciduous forests; the gray squirrel (*Sciurus carolinensis*); the red squirrel (*Tamiasciurus hudsonicus*); and the flying squirrels (*Glaucomys sabrinus* and *Glaucomys volans*). At least in the forests and clearings of the Erie Lowland, the fox squirrel (*Sciurus niger*) was also present (Hamilton 1963:230-236).

These forest zones also contained a wide variety of avian resources. The wild turkey (*Meleagris gallopavo*) is notable here as it occurs in much of southern New York today and had a wider range prehistorically (Bull 1985). The passenger pigeon (*Ectopistes migratorius*) formerly migrated across the Appalachian Plateau where it was attracted to acorns and beech-mast. Many raptors, including the goshawk (*Accipter gentilis*), Cooper's hawk (*Accipiter cooperi*), the broad-winged hawk (*Buteo platypterus*), the red-shouldered hawk (*Buteo lineatus*), the great horned owl (*Bubo virginianus*), the barred owl (*Strix varia*), and possibly the saw-whet owl (*Aegolus acadicus*), would have frequented these forests (Bent 1961a, 1961b; Bull 1985). A variety of small birds (e.g., *Dryocopus pileatus, Sphyrapicus varius, Picoides villosus*) also inhabit the forests of southwestern New York, but their economic importance to the aboriginal inhabitants is uncertain.

A third terrestrial resource zone also can be identified. This zone can be called the forest clearing zone. It includes both naturally occurring prairie-meadow openings, which were largely confined to the Erie Lowland, and anthropogenic openings in both forest types. The specific origins of such forest openings would be very difficult to discern on the basis of faunal resources.

There are a few open country mammalian species of uncertain prehistoric occurrence in southwestern New York. Merritt (1987:325-326) suggested that badgers (*Taxidea taxus*) were in Pennsylvania prior to historic times, and his reasoning could be applied to southwestern New York State as well. The bison (*Bison* spp.) is known to have occurred in small numbers just west of the Appalachians in historic times, although it was extirpated during the early nineteenth century (Merritt 1987:338-339).

Moreover, many mammals prefer the edges of forests and disturbed areas. Examples found in southwestern New York are the eastern cottontail (*Sylvilagus floridanus*), which is less common in dense forests than in brushy areas of secondary growth; the woodchuck (*Marmota monax*), which also can be found within the forest but prefers open fields and forest edges with brushy cover; and the striped skunk (*Mephitis mephitis*), which is most abundant in disturbed habitats near farms. Although Merritt (1987:251) noted that the red fox (*Vulpes vulpes*) has been lacking from prehistoric faunal assemblages in Pennsylvania, it is possible that this species was an inhabitant of forest edges in southwestern New York. The coyote (*Canis latrans*) could also be characterized as fond of brushy, disturbed forest edges, but the prehistoric presence of this species in southwestern New York State is more questionable. Deer and elk, of course, also frequent forest edges and clearings.

Avian taxa found at forest edges and in clearings in prehistoric times would have included the mourning dove (*Zenaida macroura*), which is particularly common in agricultural areas today; the ruffed grouse (*Bonasa umbellus*), which prefers clearings or second-growth woodlands; and the woodcock (*Scolopax minor*), which was formerly common in New York State. Many raptors, including the great horned owl, the screech owl (*Otus asio*), the sharp-shinned hawk (*Accipiter striatus*), the red-tailed hawk (*Buteo jamaicensis*), and, as a winter visitor, the rough-legged hawk (*Buteo lagopus*), might also have been found in edge settings (Bull 1985). Turkeys would also have been attracted to forest edges. In fact large numbers of avian taxa are found in forest-edge areas today.

The greatest natural abundance and diversity of plant and animal resources are expected along the interfaces of the terrestrial zones. Forest openings, either of natural or anthropogenic origin, and the forest edges immediately adjacent to such openings are productive areas. In contrast, dense mature forest stands should be relatively unproductive. Given the existence of natural openings in the beech-maple forest of the Erie Lowland as well as of anthropogenic clearings, it might be argued that the lowland would naturally have been more productive than the plateau in general. This is a point which deserves further investigation.

It should also be noted that the long-term consequences of clearing by humans can alter the character of local vegetation (see Day 1953) and in doing so, significantly change the productivity. It is clear that this has happened in historic times, but the prehistoric impact from humans remains largely unexplored (Wykoff 1991). Following Green (1980), understanding the nature of this human impact over time would seem critical to the modeling of late prehistoric and protohistoric environments.

The aquatic resource zones in the vicinity of the Ripley Site are the Lake Erie zone and the riverine zone. Within the riverine zone, it would be possible to draw some distinctions between the fauna of the Lake Erie drainage and that of the Allegheny River drainage because fish taxa are not equally represented in both drainages. It seems unlikely that these differences would have been critical to the aboriginal inhabitants of New York State. On the other hand, the differences in drainage characteristics noted earlier in this chapter may prove to be significant in structuring the kinds of fish available. More careful analysis of this issue needs to be undertaken.

A number of mammalian species are attracted to the streams, creeks, and swamps of southwestern New York. Significant species include the beaver (*Castor canadensis*), which inhabits wooded streamsides; the muskrat (*Ondatra zibethica*), a species of streams, swamps, creeks, and their shorelines; and the mink (*Mustela vison*), which is most common along stream and river banks and in marshy areas.

Many species of waterfowl also are found in the aquatic zones with the highest densities occurring along Lake Erie or where there are larger expanses of water. Included here are the Canada goose (*Branta canadensis*), the black duck (*Anas rubripes*), and the wood duck (*Aix sponsa*) (Bull 1985). Bull (1985) has noted that the green-winged teal (*Anas crecca*) and the blue-winged teal (*Anas discors*) both breed in New York State today, and that the hooded merganser (*Mergus cucullatus*) sometimes is an abundant migrant in the vicinity of Chautauqua Lake. Other ducks of likely significance to prehistoric peoples would have been the pintail (*Anas acuta*), the baldpate or American wigeon (*Anas americana*), and the northern shoveler (*Anas clypeata*) because they frequent marshes and woodland streams. Although present in the area, open-water ducks, such as the redhead (*Aythya americana*), may have been less accessible and thus less important to prehistoric peoples. The presence of many of these species, of course, would have been seasonal.

Perhaps the most important faunal resources of these two aquatic zones would have been the fish. Preliminary study of the fishes of New York suggests that well over 100 species of fish probably were available prior to modern destruction and alteration of aquatic habitats (see Smith 1985).

Significant species of fish largely confined to Lake Erie except for spawning include lake sturgeon (*Acipenser fulvescens*), which is no longer found in Lake Erie; possibly paddlefish (*Polyodon spathula*) (Smith 1985:50); channel catfish (*Ictalurus punctatus*); quillback (*Carpiodes cyprinus*); lake herring

(*Coregonus artedii*); lake whitefish (*Coregonus clupeaformis*); lake trout (*Salvelinus namaycush*); sauger (*Stizostedion canadense*); walleye (*Stizostedion vitreum*); and freshwater drum (*Aplodinotus grunniens*). Small, deep-water forms like spoonhead sculpin (*Cottus ricei*), which may be extinct in New York, and deepwater sculpin (*Myoxocephalus thompsoni*) would have been of questionable significance to prehistoric peoples.

Other species of fish are more likely to be found in the riverine zone. Some of the species included here are bullheads (*Ictalurus melas, Ictalurus natalis, Ictalurus nebulosus*); white sucker (*Catostomus commersoni*); northern hog sucker (*Hypentelium nigricans*); redhorses (*Moxostoma* spp.); grass pickerel (*Esox americana*); numerous minnows (Cyprinidae); rock bass (*Ambloplites rupestris*); various sunfish (*Lepomis* spp.); smallmouth bass (*Micropterus dolomieui*), which originally was confined to the Lake Erie drainage; crappie (*Pomoxis annularis, Pomoxis nigromaculatus*); and various darters (*Etheostoma* spp., *Percina* spp.). Lampreys (*Lampetra appendix, Icthyomyzon* spp.) are presumed to have been unimportant resources for prehistoric peoples. Both yellow perch (*Perca flavescens*) (Smith 1985:337) and northern pike (*Esox lucius*) (Smith 1985:250) might have been taken in either of the two aquatic zones and were likely food fish for prehistoric peoples.

Lake Erie has been characterized as a highly productive resource zone by some researchers (Beckerman 1981:82) on the basis of information on the commercial catches prior to the middle of this century. Until this time Lake Erie consistently produced the largest poundage of fish of all the Great Lakes. It is important to note that the eastern basin of Lake Erie, which is adjacent to the Ripley Site, is the deepest and least productive part of the lake. High productivity figures for Lake Erie generally refer to the shallow Western Basin (Beckerman 1981:82). This makes it difficult to derive quantitative estimates of productivity for the immediate vicinity of Ripley.

In summary, animal resources have been discussed in terms of five resource zones containing a variety of mammalian, avian, and piscine species. More thorough description of these zones will have to consider the distribution of reptiles, amphibians, and invertebrates. There also are many ways in which finer habitat distinctions for the area surrounding the Ripley Site might be made. Within each of these broad zones, further distributional structure relating to vegetational succession or to other microenvironmental factors may be noteworthy. Similarly for aquatic species, bottom characteristics, current, and turbidity affect distributions at a finer scale. Some of this detail may be relevant to understanding resource catchments for the Ripley Site. In addition, further investigation of the distribution of plant resources and of abiotic resources such as lithic raw materials and clay sources may prove important.

DISCUSSION

The environmental setting of the Ripley Site is interesting in its own right and important to gaining perspective on the function of the site and of the cultural adaptations of its inhabitants. Thus, reanalysis of the Ripley Site necessitated gathering information on various aspects of the environmental context, including the physical features of the landscape surrounding the site, the soil characteristics at the site and vicinity, the vegetational characteristics and animal resource distributions for the region, and consideration of the character of this environment at the time of the Ripley Site's occupation.

While this preliminary work did not provide a detailed catchment analysis for the site, it does suggest that the environmental context of the Ripley Site is structured by three important contrasts. In turn, each of these contrasts relates to important issues in understanding human adaptations at the Ripley Site.

The first significant contrast is the physiographic juxtapositioning of the Erie Lowland and the Allegheny Plateau. As has been discussed, there are marked differences in the climate, bedrock strata, and soils between the Erie Lowland and the Allegheny Plateau that affect vegetation patterns, arable land, and animal resources. Although the Ripley Site is located in the Erie Lowland, the lowland is only about 3.2 km wide in the vicinity of the site. As a result, the habitats and resources of both physiographic zones would have been available to people at the Ripley Site. In the most general sense, this contrast contributes to a resource-rich environmental setting, but it is probably more important to envision the contrast as structuring the adaptive strategies of Ripley's inhabitants in more complex and subtle ways.

The real significance of this physiographic contrast for human adaptive strategies at Ripley depends on both the function and the dating of the site. If the Ripley Site does represent a village of horticulturalists inhabited after ca. A.D. 1500, arable land probably would have been restricted to the Erie Lowland, while wild resources of value would have been found on the lowland and the Allegheny

Plateau. If the main occupation of the site was earlier or if Ripley does not represent a village, arable land is less likely to have been a limiting or perhaps even a critical resource. Nevertheless, other implications of this physiographic contrast may prove to have been significant.

The second environmental contrast that may be important to understanding human adaptations at the Ripley Site is that of terrestrial and aquatic resource zones. Both zones obviously existed in close proximity to the Ripley Site, with the Lake Erie zone having the potential of being particularly productive for human exploitation. Assuming that historic records of the lake's productivity can be used to extrapolate for the late prehistoric period, Lake Erie would have been a highly productive fishery. Abundant fish resources as well as seasonal abundances of waterfowl can be envisioned even though the relatively deep, east end of the lake near Ripley was not the most productive part and aboriginal fishing techniques prevented most exploitation of deep-water species. Moreover, these aquatic resources are more easily and rapidly renewed than terrestrial mammal populations. As a result, aquatic resources are more likely to support intensive harvesting.

Thus, an initial review of the environmental setting of the Ripley Site suggests that an important issue is the degree of reliance on aquatic as opposed to terrestrial resources. In other words, how much utilization of Lake Erie is evident? If the traditional assumption about the Ripley Site being a horticultural village is correct, utilization of lake resources seems highly likely. On the other hand, if the site's function was much more limited in scope, exploitation of aquatic resources might have been more restricted as well. Since the initial faunal investigations do indicate relatively low proportions of fish (Chapter 7), further investigation of the aquatic/terrestrial contrast is needed. Assumptions about the productivity of the Lake Erie zone as opposed to terrestrial zones and expectations about the subsistence behavior of horticulturalists, such as the Northern Iroquoians, need detailed examination.

The third significant environmental contrast is dependent on human population levels and on human settlement distributions. This contrast is between natural resource distributions and those induced by humans, which may be called anthropogenic. Archaeologists are just beginning to incorporate the study of anthropogenic transformations of ecological settings into their environmental reconstructions, but this issue clearly cannot be ignored at the Ripley Site and is especially important if the site does represent a large, agricultural village as long assumed. Assuming the Ripley Site's inhabitants were slash-and-burn horticulturalists means that we must also assume that the nearby forest zones were modified by clearing and abandoning fields and gardens as well as by the eventual movement of villages themselves. In terms of the resource zones outlined in this chapter, this process would result in an increased amount of "forest clearing zone" and a corresponding decrease in the forested areas per se. Particularly in the lake plain, natural forest clearings would have been present, but several centuries of horticultural activities and village movements would have produced a mosaic of fields, clearings, and forests in various stages of succession and far from pristine. The distribution and abundance of both plant and animal resources obviously would have been altered by these processes. These changes must be envisioned as much more complex than simple increases in amounts of food resources, and much more research on this topic is needed.

Other alterations of the forests around the Ripley Site also may have occurred. For example, Wykoff (1991) has proposed that Northern Iroquoians introduced the black walnut (*Juglans nigra*) and possibly other nut and fruit trees into the Northeast. It is particularly interesting that Wykoff has suggested that if black walnut was grown for its fruit rather than for lumber, it had to be grown in the open at the edges of clearings (Wykoff 1991:16).

In sum, three aspects of the environmental setting of the Ripley Site deserve more intensive study because they relate to important issues about human adaptations in the area. These three areas are the physiographic contrast between the Erie Lowland and the Allegheny Plateau, the relative productivity of the aquatic and terrestrial zones found in proximity to the site, and the extent to which human modification altered the natural resource distributions near the Ripley Site. Each of these is an important topic for further research by the Ripley Archaeological Project.

CHAPTER 3

CULTURAL CONTEXT

William Engelbrecht and Lynne P. Sullivan

The first part of this chapter discusses current perspectives on the earthwork sites of southwestern New York and the bearing these views have on present interpretations of the Ripley Site. The second part briefly reviews existing information on southeastern Lake Erie Basin cultural developments that may have influenced the inhabitants of the Ripley Site. This discussion focuses on the late prehistoric through early historic periods (ca. A.D. 1000-1650). Readers interested in the developments leading up to A.D. 1000 can find this information in a literature survey for the entire southern Lake Erie Basin edited by Curtis and Hatch (1981).

The two sections of this chapter are not easy companions. This situation is a direct consequence of the challenge the Ripley Site data pose for the generally accepted interpretation of all earthwork sites in New York as fortified villages. This long-held interpretation has become incorporated as a basic assumption of the regional models used to frame discussions of cultural developments in late prehistory. Indeed, the assumption that all earthwork sites are villages has become so intrinsic to current models that the presence of an earthwork at a site often is not even mentioned. The earthwork has, in fact, come to be viewed as a defining attribute of a village site. A review of the literature shows that many of the sites discussed as village sites in the second part of this chapter are minimally investigated earthwork sites.

Since this is the case, the problem of the function of the earthwork sites is not addressed in current models for the region, nor has the problem of understanding the variation in these sites been seriously addressed in New York for over three decades (see Guthe 1958). The need to revisit this assumption required the junior author to examine the history of thought about the earthworks and to make this problem a focus of discussion. Resolution of the earthwork problem is a specific focus of the Ripley Archaeological Project's long-term goal to develop refined regional models.

LATE PREHISTORIC EARTHWORKS AND THE RIPLEY SITE

The Ripley Site is one of many poorly understood and reported earthwork sites in the southeastern Lake Erie region. Early investigators in the western part of New York State documented many such embankments that formed enclosures (cf. Cheney 1859; Edson 1875, 1894; Larkin 1880; Squier 1851; Thomas 1894), such as the ring at the Ripley Site. These investigators often compared the earthworks in western New York to those of the Ohio Valley.

Most of the earthworks, like the Ripley Site, are situated near bluff edges. Some occur on low rises near the banks of streams, and a few have been reported on elevations in swamps (Squier 1851:12). The enclosures are quite variable in form. Some are shaped as circles or ovals, and a few rectangular enclosures have been reported. Others appear to follow the natural contours of the ground, while still others are linear. The earthen embankments seldom exceed 1.2 m in height and are often accompanied by a shallow ditch. Some enclosures appear to have gates or entranceways. The area enclosed is usually less than 1.6 ha, but areas as large as 6.4 ha have been reported (Squier 1851:12).

Squier (1851:12) and Cheney (1859) both reported large pits or caches as being located within the enclosures, and Squier (1851:13) stated that carbonized corn was found in many of these pits. He (1851:13) also noted that the sites of "ancient lodges or cabins," marked by deposits of cultural debris, could be traced within many enclosures. Burials also often are mentioned in the site descriptions, and ossuaries have been reported as sometimes associated with enclosures (e.g., Shock 1976:94), but the mortuary practices associated with these sites have not been a specific focus of inquiry. In general, very little substantive information is readily available about the features within and around the embankments.

The generally accepted interpretation of the earthworks as defensive fortifications (Parker 1907, 1922; Stothers and Graves 1983; White 1961, 1963, 1977) was first proposed in the nineteenth century (Cheney 1859; Squier 1851). Parker (1922) believed the embankments were bases for palisades that fortified habitation sites, despite the fact that he did not find evidence of palisades in several of the embankments he excavated, including the Ripley Site.

White (1961, 1977:89-90) followed Parker's lead and derived most of her ideas about the archaeology of the region around Buffalo, known as the Niagara Frontier, from models developed in the Seneca Iroquois area to the east. She dated the enclosures to the late prehistoric period and assumed that these sites all represented villages. Her 1962 excavation of the Henry Long Site in Erie County, New York, appeared to support this assumption as she discovered one longhouse-type structure (20 m x 6 m) within the small (less than 0.8 ha), irregularly shaped enclosure (White 1963b). To date, however, no analyses of the collections from this site have been made to evaluate her assumption that this structure indeed served a domestic function.

White (1961:54) suggested a correlation between the enclosures and flat, defenseless terrain as opposed to the absence of these structures in hilly, defendable situations. She (1961:54) called for careful excavations to look for the presence of palisades. Stothers (1978:37; Stothers and Graves 1983:119-120) has also supported the views that the earthworks are defensive fortifications and that they form lines of demarcation between opposing cultural groups. This latter idea originally was expressed by Cheney (1859:37, 51) for some of the earthworks (see below).

In a paper describing excavations in Tompkins County, New York, of an earthen embankment that clearly contained evidence of a palisade, Jones and Jones (1980) compiled a list of eighteen embankments that had been investigated for evidence of palisades. Ten enclosures yielded this evidence in the form of post molds or intact poles. The remaining eight contained no such evidence. When the investigated earthworks on the Jones' list are plotted on a state map, it is clear that the sites represent two distinct regions. One is the traditional homeland of the Onondagas in west-central New York, where most sites were investigated by James Tuck (1971). Of the seven sites in this group, only one did not show evidence of a palisade. The other area is the combined Niagara Frontier and Chautauqua/Allegheny area of extreme western New York. Of the eleven sites in this region, only four showed evidence of a palisade. Although this sample is small and undoubtedly biased, there is a clear implication that the functions of enclosures in the western region may be different than that of enclosures in the territory of the Iroquois Confederacy. Thus, ideas about enclosure sites developed in one cultural region may not be directly applicable to another.

The idea that some earthworks in the lower Great Lakes region are connected with ceremonial rather than defensive activities is not a new one. An alternate interpretation of the earthworks was first proposed in the nineteenth century by Cheney and was later revived by Alfred Guthe in the 1950s. This idea suggests that while some embankments probably were associated with village fortifications, other enclosures were ceremonial in nature and not necessarily associated with habitation sites. Cheney's (1859) investigations led him to divide the enclosures into two general categories, sacred enclosures and fortifications, but his distinctions between these categories were not clearly specified. Often the separation appears to have been based on his impression of whether a particular enclosure's location was suitably defensible as a military fortification. He described the sacred enclosures simply as "designed for religious and ceremonial purposes" (Cheney 1859:43). Cheney thought the distribution of the fortifications (as opposed to sacred enclosures) generally reflected the boundary between the Iroquois Confederacy and what he termed "hostile Appalachian groups" (Cheney 1859:37, 51).

Working in the Chautauqua/Allegheny area, Guthe (1958) revived Cheney's (1859) idea that the earthworks served at least two functions, some being village fortifications and others ceremonial centers. He pointed out that some embankments showed evidence of supporting palisades and others did not. The shallow refuse deposits in some of the enclosures indicated to Guthe that they were not habitation sites, since the length of time the sites were occupied appeared disproportionate to the time invested in constructing the enclosures. Guthe subdivided the enclosures into three categories: (1) walls closing off a promontory from the rest of the land at that elevation; (2) irregular walls following the natural contours of the ground surface; and (3) circular enclosures surrounded by a shallow ditch. He also suggested that the presence of the enclosures "implies a type of economy and social pattern analogous to the Hopewell even if we cannot definitely attribute them to Hopewell descendants" (Guthe 1958:65-66).

In sum, there are no studies that have addressed the regional problem of the function(s) of the earthwork sites in a systematic fashion. Information

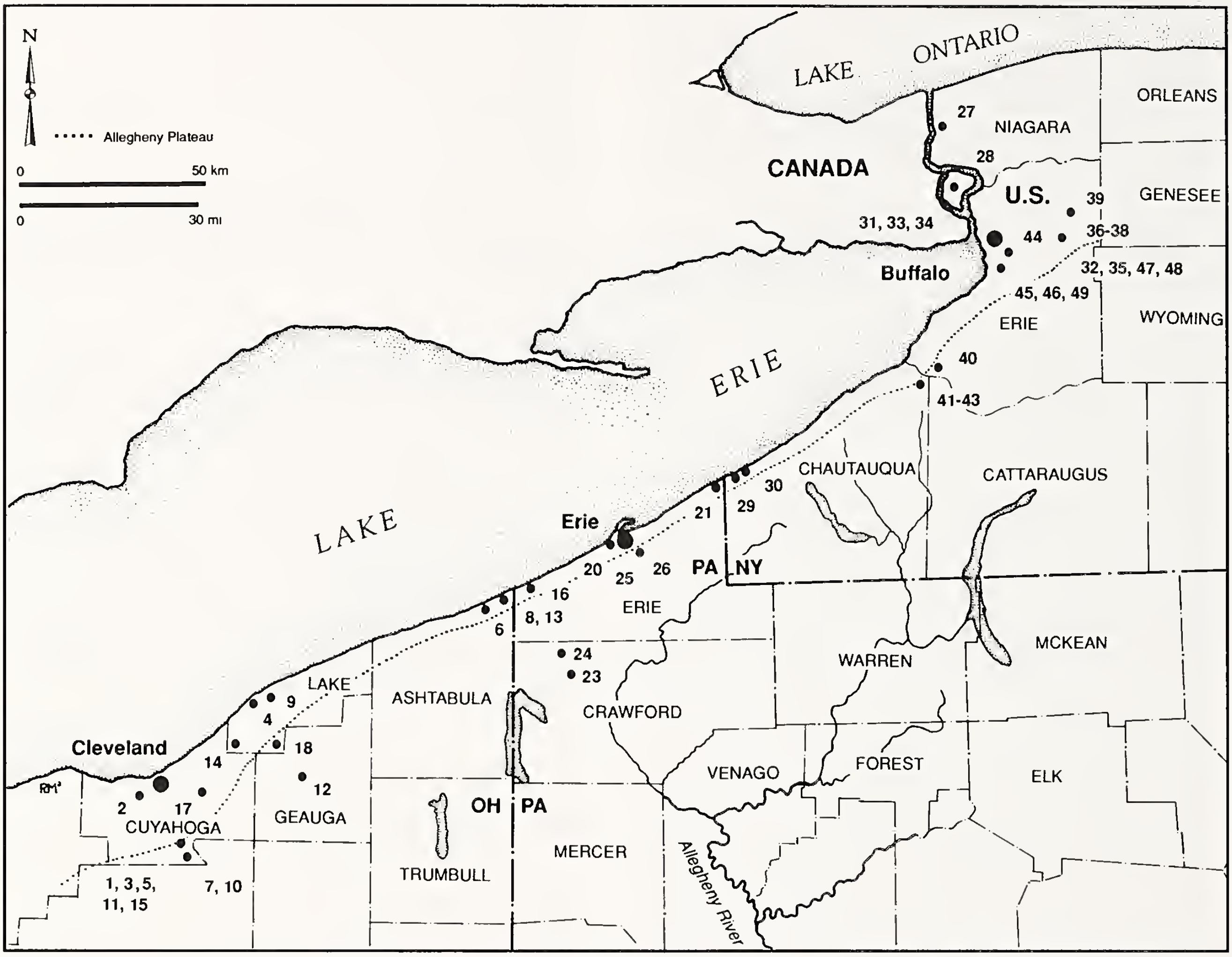

Figure 3.1 Map of the southeastern Lake Erie Basin. Numbers indicate locations of sites mentioned in the text. *Ohio sites:* (1) Kurtz; (2) Avon Plant; (3) South Park; (4) Fairport Harbor; (5) Walnut Tree; (6) Conneaut Fort; (7) Seibert; (8) Eastwall; (9) Ahlstrom; (10) Greenwood Village; (11) Tuttle Hill; (12) Hillside Road; (13) Bennett; (14) Andrews School; (15) Carey Hill; (16) Rogers 1 & 2; (17) Ambler Metro Park #2; (18) Lyman. *Pennsylvania sites:* (19) Kinzua; (20) Griswold; (21) Scieford; (22) Onoville; (23) McFate; (24) Wilson Shutes; (25) 28th Street; (26) Winter Green Gorge. *New York sites:* (27) Portage; (28) Martin; (29) Westfield; (30) Peacock; (31) Buffum; (32) Goodyear; (33) Hart Farm; (34) Farthing; (35) Webster; (36) Nursery; (37) Harris Hill/Brunea; (38) Henry Long; (39) Christiansen ; (40) Silver Heels; (41) High Banks; (42) Double Wall Fort; (43) Burning Springs; (44) Eaton; (45) Green Lake; (46) Kleis; (47) Newton-Hopper; (48) Simmons; (49) Bead Hill.

about individual sites is largely unpublished, and existing collections have not been analyzed to address issues of site function. The general preference of archaeologists for the interpretation of earthwork sites as fortified villages appears to be based mainly on well-known descriptions of fortified historic Iroquois villages. Careful, independent assessment of archaeological data has yet to be done. If such an assessment negates the assumption that all earthwork sites are fortified villages, then the implications for current models of regional prehistory are quite significant.

CULTURAL DEVELOPMENTS IN THE SOUTHEASTERN LAKE ERIE BASIN: CURRENT MODELS

The region discussed here includes the extreme western section of New York (portions of Chautauqua, Cattaraugus, Erie, and Niagara counties), the northwestern corner of Pennsylvania (Erie, Crawford, and Warren counties), and the northeastern corner of Ohio (portions of Cuyahoga, Geauga, Lake, and Ashtabula counties) (Figure 3.1). In New York, Erie and Niagara counties are in the area known as the Niagara Frontier. This area encompasses the relatively low land lying between Lake Erie and Lake Ontario. The Niagara Frontier is distinct from the Chautauqua/Allegheny area, which extends from the southwestern corner of New York into Pennsylvania and Ohio. This latter area is the location of the Ripley Site and is characterized by a sharp division between the lake plain and adjacent Allegheny Plateau (Figure 2.2).

Two differing chronologies are in use in the region. The sequence proposed by Mayer-Oakes (1952) and Ritchie (1965) is the convention for archaeologists working in Pennsylvania and New York. This chronology places the beginning of the Late Woodland Period at A.D. 1000 with the end at European contact. A rather arbitrary division distinguishing the early part of the period from the later part is made at A.D. 1300. The chronological sequence in Ohio follows that in general use in the rest of the Great Lakes region, which sets the beginning of the Late Woodland Period at A.D. 500 and refers to the period from A.D. 1000 to European contact as the Terminal Late Woodland Period. For consistency, the discussion presented here of northeastern Ohio prehistory is cast within the New York and Pennsylvania framework.

Another impediment to achieving a comprehensive understanding of this region is the use of very different organizational models for the late prehistoric through early historic periods by the archaeologists working in the southeastern Lake Erie Basin. These various models imply differing settlement and subsistence strategies, including differences in length of occupation of village sites, differences in sociopolitical organization, and possible differences in subsistence strategies. These models also have led to different conceptualizations and usage of cultural/historical taxonomies and developmental sequences (Table 3.1). One common feature of these models is a proposed general increase in sedentism, population, and reliance on maize horticulture throughout late prehistory.

In New York, village-movement sequences developed in the adjacent Seneca Iroquois region (Engelbrecht 1987; Niemczycki 1984; Widmer and Webster 1981:77; Wray and Schoff 1953) are widely used as an organizing model for Late Woodland and protohistoric research (cf. Tuck 1971). Using the historic Huron as an analogy, these sequences are predicated upon the assumption that prehistoric and early historic groups maintained permanent villages but moved them at frequent intervals, perhaps as often as every ten to twenty years. Cyclical reuse of these village sites is not implied in the model. Soil depletion for agricultural purposes and/or depletion of firewood are usually cited as the impetuses for these moves (Engelbrecht 1987; Widmer and Webster 1981:77).

Other elements of the village-movement model are compatible with the type of sociopolitical organization similar to that recorded for historically known Iroquoian groups (Trigger 1981). Such societies fall under the general rubric of tribal societies (Braun and Plog 1982; Service 1962) and are characterized by a lack of institutionalization of ascribed leadership positions, reliance on village councils for decision-making rather than vestment in an hereditary chief, and importance of relationships between kin-based groups (such as clans) for intra- and intersocietal interactions. While such broad categorizations are useful for conceptualization of a general range of sociopolitical variation, more precise models are necessary for comparisons directed at explicating differences between societies and ultimately for a clearer understanding of sociopolitical variation.

In northwestern Pennsylvania, current models derive from trait-based distinctions among late prehistoric manifestations in differing physiographic zones (Lantz 1989). Thus, several contemporary late prehistoric cultures or phases have been proposed, each correlated with a particular geographic locale (e.g., lake plain, upper Allegheny River valley). A tribal type of organization is again implied, but this model suggests a different configuration of the sociopolitical landscape as well as differences in settlement and subsistence strategies, since lake plain adaptations would presumably differ from those in the uplands.

Late prehistoric research in northeastern Ohio is based on settlement-subsistence models focusing on seasonal exploitation of plant and animal resources (cf. Brose 1978b; Brose and Scarry 1976). While the Ohio models suggest differing degrees of population mobility through time, multiple occupations and continued use of the same site over a long period of time are not precluded. A further implication of these models is that a number of roughly similar societies, generally categorized as tribal societies, occupied segments of the southeastern Lake Erie Basin. Potential differences in settlement and subsistence strategies and sociopolitical organizations are unclear.

The Early Late Woodland Period (A.D. 1000-1300)

Sites of this time period are usually small and located on the lake plain and in the uplands. The degree of sedentism of regional populations at this time is an issue of some debate. With the appearance

TABLE 3.1. CULTURE HISTORICAL DESIGNATIONS AND CHRONOLOGY FOR THE SOUTHEASTERN LAKE ERIE BASIN.

Time Years A.D.	Period	Northeastern Ohio[1]	Northwestern Pennsylvania[2]		Southwestern New York	
			Plateau	Lake Plain	Niagara Frontier[3]	Chautauqua[4]
1000	**Early Late Woodland**	Riverview Phase	Allegheny Iroquois	Lake Plain Iroquois	Princess Point Complex?	Allegheny Phase
1100		Fairport Phase				
1200	**Terminal Late Woodland**				Uren/Middleport Phases, Middle Ontario Tradition?	Chautauqua Phase
1300		Greenwood Phase				
1400					Village Sequences *Western*: Buffum Site Eaton Site Green Lake Site Ellis Site Kleis Site *Eastern*: Goodyear Site Newton-Hopper Site Simmons Site Bead Hill Site	
1500	**Contact**	South Park Phase	Erie			?
1600	**Historic**				Erie, Neutral, Wenro? Seneca	Erie, Neutral, Wenro?
1700						

[1] Brose 1976c, 1978b

[2] Lantz 1989

[3] Ritchie 1965; Stothers 1977; White 1961, 1976, 1978; Wray and Schoff 1953

[4] Schock 1974, 1976

of hardy eight-row Northern Flint corn, maize horticulture became well established in the area by A.D. 1100 (Ritchie 1969). However, the extent to which the region's population actually relied on horticulture for their subsistence at this time and the concomitant effect such reliance had on sedentism are not clear.

Marian White (1963a) questioned the validity of the village-movement model for populations in the Niagara Frontier prior to European contact. Instead, she suggested semi-sedentary seasonal movement for Early Late Woodland villages. This idea is compatible with Brose's (1976c, 1978b) proposed models for the Riverview (A.D. 900-1150) and Fairport (A.D. 1150-1350) phases in northeastern Ohio. He recognized three types of sites for these phases: summer horticultural villages, mid-summer campsites, and mid-winter campsites. The small horticultural villages are found along the lakeshore and in river bottoms near confluences with secondary streams, while the summer camps are in lacustrine environments. The winter camps, located in the uplands or on beach ridges in the lake plain, are assumed to have been hunting camps (Brose 1978a:574-575, 1978c:103-104).

Another important question concerns the societal organization of the regional population. Based on his work in northwestern Pennsylvania, Lantz (1989:23-26) has suggested that the lake plain and plateau river valleys were occupied by separate groups. The group on the plateau, termed the Allegheny Iroquois, was located in the upper reaches of the Allegheny River Valley into the Cassadaga Valley of southwestern New York. The other group, the Lake Plain Iroquois, extended along the lake plain from the northeast corner of Ohio well into New York. Lantz (1989:2) has proposed in situ development for both groups from ca. A.D. 940 to ca. A.D. 1525, and he has maintained that both groups were Erie. How such societal distinctions may have interfaced with settlement-subsistence regimes is a question that has not been addressed.

In any case, few sites that could be classified as long-term horticultural villages have been located or investigated on the lake plain in Pennsylvania and New York. Information describing the best known sites of this time period in each state is discussed below.

New York. In the Niagara Frontier, the Portage and Martin sites date to the Early Late Woodland or Terminal Middle Woodland Period. The Portage Site is located on the Niagara River near Lewiston in Niagara County. Based on the faunal assemblage, this site may be a fishing camp (Widmer and Webster 1981:51) of the Hunter's Home Phase (Ritchie and Funk 1973:119), a late Middle Woodland phase with many similarities to succeeding cultures. The Portage Site has been dated at A.D. 1000 ± 75. Ceramics from this site have straight rims with flat lips and corded decoration.

The Martin Site, on Grand Island, is located along the Niagara River in Erie County and is a multicomponent site. The Early Late Woodland pottery from Martin bears some resemblance to late Point Peninsula and early Owasco ceramics in central New York (White 1976:112), but the strongest resemblance lies with material from Ontario. Stothers (1977:27) included the Martin Site in the Grand River Focus of the Princess Point Complex. This assignment is in agreement with Ritchie's view (1965:272) that ceramics from western New York during the Early Late Woodland are more similar to those from Ontario than to the Owasco ceramics from central New York.

At the Martin Site, evidence of almost continuous occupation extends along the first terrace above the river. Excavations by Marian White in 1963 recovered an abundance of fish bones as well as remains of deer and bear. No evidence of cultigens has been found; the soil is a heavy, silty loam not particularly attractive for farming. The site was probably repeatedly occupied over a long period of time primarily as a fishing station.

In the Chautauqua/Allegheny area, the period A.D. 1000-1300 has been referred to by Schock (1974) as the Allegheny Phase. Most Allegheny Phase sites are in the Allegheny valley of the plateau (Widmer and Webster 1981:78). No farming villages are identified for this phase on the lake plain (Widmer and Webster 1981:78), with the possible exception of the Westfield Site (Guthe 1958). This site, an earthwork site in Chautauqua County, is about 2.4 km from the lake shore. Several small sites on the lake plain, such as the Peacock Site near the mouth of Chautauqua Creek, may be seasonally used fishing camps.

Pennsylvania. In the Allegheny Valley of the plateau, horticultural villages exist along the floodplains. One such village, the Kinzua Site (ca. A.D. 1200), was extensively investigated by the Carnegie Museum. It contained three oblong houses, a large central structure, and several small round houses. The artifact assemblage includes broad-based triangular projectile points and predominantly grit-tempered pottery with some Iroquoian style decorations such as collars and castellations (Dragoo 1977; Schock 1974; Widmer and Webster 1981:78).

Several small lake plain sites either represent seasonally used fishing stations (Widmer and Webster

1981:78) or may be small summer horticultural camps. One such site, the Griswold Site, excavated by Engelbrecht in the summers of 1972 through 1974, is located just west of Erie, Pennsylvania, along a small stream 1.2 km south of Lake Erie. The stream has cut a deep ravine, and there is a light scattering of debris along the ravine for at least 0.1 km. In a few places, cultural material is more densely concentrated. Judging from the grit-tempered ceramics, the site probably dates to about A.D. 1200. The extensive site area suggests that Griswold was repeatedly occupied over a period of time, with the area of occupation shifting from year to year and resulting in a number of occupation areas. While no cultigens were found, the soil is a sandy loam suitable for horticulture, and the possibility that there were a series of horticultural settlements at Griswold cannot be dismissed.

One clearly horticultural village on the lake plain is the recently excavated Sceiford Site. This site, investigated by the Carnegie Museum, is about 1.5 km south of the lake and near the New York state line (Lantz 1989:14). Radiocarbon dates place the occupation ca. A.D. 900 and 1100. A semi-rectangular structure, measuring about 6-8 m on a side, and several possible small, circular structures were exposed (Lantz 1989:15). The presence of maize, black walnut, and a variety of animal bones suggest long-term occupation at the site. Ceramics and lithics further indicate that the site was occupied off and on over a 150-year period (Lantz 1989:14).

OHIO. Few Riverview Phase sites have been intensively investigated. The Kurtz Site (Brose 1978c:103), located in an alluvial bottomland, is an example of a Riverview Phase horticultural village (Widmer and Webster 1981:62). The upland Avon Plant Site is thought to be a Riverview Phase winter hunting camp (Brose 1978c:104; Widmer and Webster 1981:62).

Sites correlated with the Fairport Phase are better known. The Fairport Phase component at the South Park Site (Brose 1973) appears to represent a late spring to early autumn occupation. Several single-post oval structures were associated with this component. Floral and faunal assemblages suggest a subsistence pattern based on hunting and gathering supplemented by maize horticulture. It is possible that long-term occupation did not occur at the site during Fairport times because there is no consistency in orientation of the structures or any domestic features that would indicate occupation of any duration (Widmer and Webster 1981:69).

Another possible Fairport Phase horticultural village is the Fairport Harbor Site (Brose 1976c; Murphy 1971a). Dating for this site is somewhat unclear, but the site may represent either a summer village with intensive occupation (Widmer and Webster 1981) or a spring fishing camp (Brose 1976c:39).

Other Fairport Phase sites include the Walnut Tree and Lillback sites, and possibly the Conneaut Fort Site (Pratt 1979; Widmer and Webster 1981:69-70). These sites have all been interpreted as winter hunting camps. At least two oval dwellings and evidence for possible storage of maize for winter use were discovered at the Walnut Tree Site. No features or structures were found at the Lillback Site, and it may represent a transient hunting camp, located away from the lakeshore (Widmer and Webster 1981:69-70).

The Conneaut Fort Site was designated as a winter camp by Brose (1978c:100), but Widmer and Webster (1981:70) noted that the presence of leopard frog and bullfrog remains argues strongly for a more permanent occupation, since these frogs hibernate. Large numbers of features, including storage pits, a broad range of artifact types, including ground stone plant-grinding tools, as well as an earthen fortification and the nearly 0.8-ha size of the site support the argument for long-term occupation (Widmer and Webster 1981). The Conneaut Fort Site dates to approximately A.D. 1340, and it is unclear whether the site is best placed with the Fairport or succeeding Greenwood Phase. The ceramics at this site are more characteristic of the Fairport Phase and show stylistic similarity to those from western New York (Brose et al. 1976).

Fairport Phase ceramics are grit tempered and cordmarked to the rim, and they sometimes include oblique tool impressions or circular punctates as decorative elements. Lithics include broad-based triangular points and few other formal tools.

The Terminal Late Woodland Period (A.D. 1300-1500)

A change in settlement and subsistence practices at this time has been suggested for northeastern Ohio (Widmer and Webster 1981:71). Brose (1976c, 1978b:580) has suggested that by around A.D. 1400, there was a reduction in seasonal movement and more or less year-round occupation of villages. White's (1963a) suggestion of increasing sedentism and dependence on horticulture in western New York about this time is not incompatible with the model for northeastern Ohio.

Brose (1977) proposed a climatic shift, beginning at about A.D. 1300-1350, as influential with regard to settlement and subsistence practices. A shift from cool and dry to generally warmer and moister conditions may have increased yields of maize, thus promoting general reliance on maize horticulture for the subsistence base and concomitant increases in population and competition for good agricultural soil (Pratt 1979; Widmer and Webster 1981:71). Evidence for this shift comes from pollen profiles (Brose 1977).

Three types of sites for this time period, known in Ohio as the Greenwood Phase (A.D. 1350-1500), have been proposed by Brose (1977): small spring-fall horticultural villages, small seasonal economic campsites, and winter-spring camps that can be subdivided into lakeshore fishing camps and upland hunting camps. Alternatively, Widmer and Webster (1981:74) have proposed a settlement model consisting of permanent, year-round horticultural villages and seasonal campsites. The villages are usually located in defensible locations and near large tracts of good soil. The campsites are situated in environmental locales that would have supported seasonal resource procurement.

The available data from New York and Pennsylvania differ from the Ohio data. There is virtually no information on sites other than those categorized as village sites. Around A.D. 1300, sites believed to be palisaded villages, often with earth rings, were on both the lake plain and plateau. These sites usually occur in very defensible positions (Widmer and Webster 1981:78). Few of these sites have been relocated or examined since the nineteenth century.

Fewer sites are located on the lake plain than on the plateau in both New York and Pennsylvania. Sites that are situated on the plain are inland on the Whittlesey beachstrand gravel deposits, about 2-4 km from the lake (Schock 1974). Widmer and Webster (1981:79) have cautioned that this pattern may not reflect the actual settlement pattern because lakeshore erosion may have destroyed many lakeshore sites. Reports by nineteenth- and early twentieth-century investigators (cf. Cheney 1859; Edson 1875; Larkin 1880; Thomas 1894; Turner 1850) described numerous earth ring fortifications along the lake, especially at the mouths of creeks. Parker (as quoted in Doty 1925:263) also noted many "camps and villages" along the lakeshore from the Pennsylvania state line to Cattaraugus Creek.

Village sites are numerous on the plateau in the upper Allegheny and French Creek valleys. These villages are generally small, compact, and palisaded. Hilltop sites with earth rings may also comprise part of this settlement pattern (Johnson, Richardson, and Bohnert 1979; Widmer and Webster 1981:79). The internal composition of these upland sites is not well known.

Some indications of possible interaction with cultures to the west and south are also indicated at this time. Shell-tempering appears in pottery, and a few Southern Cult type motifs are found on various artifacts (Brose 1973, 1978b; Greenman 1937).

NEW YORK. In the village-movement model (Niemczycki 1984; Tuck 1971; White 1978), geographic locality is among the criteria used for assigning sites to the A.D. 1300-1500 date range. Clusters of sites are assumed to represent movements of one or two allied villages over time. Assignment of sites to this time is also based on presence/absence and amount of European trade items and on ceramic seriation. Sites with no European items, but with ceramics generally similar to those of the Contact Period, are assumed to be prehistoric. As noted above, working out the sequences of these movements in various areas is a major thrust of current research in Iroquoian archaeology.

White (1978) recognized two sequences of village movements in the cluster of sites in the Niagara Frontier. The western village-movement sequence is represented by the following sites, listed from early to late: Buffum, Eaton, Green Lake, Ellis, and Kleis. The eastern sequence is represented by the Goodyear, Newton-Hopper, Simmons, and Bead Hill sites (Figure 3.1). Goodyear, Newton-Hopper, and Simmons are located within 2.4 km of each other along terraces of Buffalo Creek; all are easily defensible. The earliest sites in each sequence, Buffum and Goodyear, are believed to date just prior to European contact. This placement is tenuous since material from these sites comes only from surface collections or from uncontrolled amateur excavations of an earlier era. The Buffum Site, in South Buffalo, has no known historic material in association with the village component. Buffum is the only site in the cluster reported to have an earth ring and an ossuary burial, traits which disappear in the Niagara Frontier by contact times.

The probable antecedents of the Buffum Site are unclear. Not far from Buffum are the Hart Farm Site and the Farthing Site, now largely destroyed. Little material remains from these sites. The proximity of these sites to Buffum suggests that they might have been ancestral. There appear to have been other sites in the area as well, now destroyed by the city of Buffalo.

The little known Webster Site is near and possibly ancestral to the Goodyear Site. Two other sites, the Nursery Site and the Harris Hill or Brunea Site, are located approximately 16 km north of Goodyear and appear to be small Iroquois villages, dating to around the fifteenth century. They, along with the Webster Site, are at present the most likely candidates for ancestral villages for the eastern sequence.

Another sequence may be represented by five sites described in 1851 by E.G. Squier in the vicinity of Clarence in Erie County. Four of these were small earthworks, between 0.2 and 0.6 ha, and closely spaced (White 1976:124-127). One of these sites, Henry Long, was excavated in 1962 by a field school from SUNY/Buffalo under the direction of Marian White. The occupation area included a single longhouse measuring 20 m by 6 m, a palisade, and ditch. Cultural debris was generally scarce, although a maize-filled pit was found inside the structure. The ceramics are similar to those associated with the Uren and Middleport phases of the Middle Ontario Tradition and suggest an occupation date of around A.D. 1350.

Until recently, the Henry Long Site was the only one of Squier's five Clarence area sites that had been relocated (White 1963b). A survey for proposed wastewater treatment facilities revealed the Christiansen Site, which may be another of Squier's Clarence sites. Christiansen was tentatively identified as a Middle Ontario Iroquois, Middleport Phase site (Rosenzweig 1983).

A number of ossuaries have also been found in the Clarence area, and these are probably associated with the above sites. Using the Huron Feast of the Dead as an analogy, White (1976:127) suggested that two or more of these communities may have interred their dead in a single ossuary. White (1976:124-127) also considered the inhabitants of these sites to be ancestral Erie.

As in the Niagara Frontier, the model most frequently applied to the Chautauqua/Allegheny area is the village-movement model. Schock (1976) suggested four possible village-movement sequences, which he designated the Chautauqua Phase (A.D. 1300-1525). One is located along Cattaraugus Creek, another on Clear Creek, a third on Cassadaga Creek, and the fourth in central Chautauqua County near the headwaters of the Allegheny River (Widmer and Webster 1981:78-79). Shell-tempering is characteristic of Chautauqua Phase ceramics.

Schock (1976) suggested that the Cattaraugus Creek cluster of sites represents a series of locations of a single community. These sites are situated along the floodplain or terrace of the creek. Most of these sites lie on or near the Cattaraugus Indian Reservation, and little work has been done on them since the early years of this century. Two sites, Silverheels and Highbanks, have historic trade material along with Iroquois material. Schock (1976:108) suggested that the Silverheels Site was both a late prehistoric habitation site and a later burial site for the early historic population living at the nearby High Banks Site. There are at least eight other Late Woodland (including the Double Wall Fort and Burning Springs sites) and early historic sites along Cattaraugus Creek.

Unlike the Cattaraugus sites, other Chautauqua Phase sites are situated in high, defensible positions overlooking major stream valleys (Widmer and Webster 1981:79). No villages of this phase have been identified on the lakeshore. Sites that are situated on the lake plain are inland on the Whittlesey beachstrand gravel deposits (Schock 1974).

Pennsylvania. As in New York, few pre-contact village sites are located on the lake plain in Pennsylvania. Such sites are plentiful in the upper Allegheny and French Creek valleys, including the Onoville, McFate, and Wilson Shutes sites. Excavations at the Onoville Site revealed several large longhouses, numerous small circular buildings, and a palisade (Dragoo 1977).

Ohio. The Greenwood Phase (A.D. 1350-1500) follows the Fairport Phase in northeastern Ohio. The most thoroughly investigated Greenwood Phase village is at the South Park Site (Brose 1973). At least nine subrectangular structures, possibly of wall-trench and wattle-and-daub construction and measuring about 9 m by 4.5 m, were excavated. Associated with the structures were multiple interior hearths and bell-shaped pits. The artifact inventory is similar to that of Fairport Phase sites, but Madison rather than Levanna-like projectile points are predominant.

The Seibert, Conneaut Fort, Eastwall, Ahlstrom, Greenwood Village, and Tuttle Hill sites are also interpreted as Greenwood Phase agricultural villages (Widmer and Webster 1981:72-73). Located on a bluff over the Cuyahoga River, about 40 km from Lake Erie, the Siebert Site (Pratt and Brose 1976) has had only limited investigations. No structures or palisades have been found at the site to date. The Conneaut Fort Site (Brose et al. 1976) is a hilltop site with an earthen enclosure covering nearly 0.8 ha. Situated near the mouth of Conneaut Creek, the Eastwall Site (Brose 1977) is quite large (about 2 ha). The Ahlstrom, Greenwood Village, and Tuttle Hill sites appear to be smaller agricultural villages (Brose 1978b; Widmer and Webster 1981:73).

One Greenwood Phase site that appears to be a temporary seasonal campsite, the Hillside Road Site, has been intensively excavated (Brose 1976b). Brose (1976b:28-31) interpreted this site as a winter hunting camp. Post-mold patterns suggesting structures were found, but the structures' shapes and patterns could not be determined (Brose 1976b). Other Greenwood Phase campsites include the Bennett (Brose 1977), Andrews School (Brose 1977; Pratt and Brose 1975), Carey Hill (Brose 1976b), and Rogers #1 and #2 (Brose 1977) sites.

The Contact Period (A.D. 1500-1650)

Distinct changes in settlement patterns occurred in the region by ca. A.D. 1550. A general trend appears to have been toward selecting lower elevations, but still highly defensible positions, for village sites. Proximity to good quality agricultural soils continued to be important. Another climatic change is postulated as a contributing factor to this shift. The Neo-Boreal episode (Baerreis and Bryson 1965), a time of cool moist conditions, could have made higher elevations unsuitable for horticulture, while the milder conditions along the lakeshore and lower river valleys would have remained favorable (Widmer and Webster 1981:80).

Some subregional variation in these shifts in settlement is apparent. Sites in the Niagara Frontier are found on the Lake Erie plain rather than the adjacent Allegheny Plateau. Most of these sites are located on defensible terrain along minor streams. In Pennsylvania, the plateau valleys were abandoned, and the latest sites are situated on the western edge of the plateau, the Portage Escarpment, overlooking the lake plain (Widmer and Webster 1981:80). In northeastern Ohio, during the South Park Phase (ca. A.D. 1500-1650), village sites occur at uniform intervals on promontories of steeply dissected bluffs along major river valleys (Brose 1977:33). Like the Pennsylvania sites, these defensible positions also afforded access to high quality agricultural soils. No villages are found along the lake plain in Ohio, although various small extractive camps still occur there (Brose 1973:39).

A gradual rise in the lake level and the consequent erosion of the lakeshore and drowning of floodplain soils have been suggested as reasons for this change in Ohio (Widmer and Webster 1981:74). Why the situation is different in the Niagara Frontier, where a number of late prehistoric villages are located on the lake plain, is not clear.

Another important development at this time is the appearance of longhouses and tightly packed fortified villages. Widmer and Webster (1981:76) correlated this development with increased warfare, competition, and population pressure, possibly aggravated by the climatic shift. Increased warfare would also have had an effect on sociopolitical organization because achievement in warfare, especially in defending a settlement, would have been an effective avenue for achieving high social status (Widmer and Webster 1981:76).

In Ohio, there also appears to have been a reduction in number of villages at this time. Whether this decrease in sites is a function of population reduction or simply the result of agglomeration is not clear. Brose (1978c:93) has suggested that the general absence of European trade goods on sites of this time period in Ohio is compatible with an actual population decline by A.D. 1650 (Widmer and Webster 1981:75-76).

The date when European trade items first appeared on sites in the southeastern Lake Erie Basin is not known. It may be as early as the first half of the sixteenth century. The amount and kind of European material found on sites steadily increased as native populations became increasingly involved in the European fur trade.

It is probable that the Niagara Frontier was rich in beaver, providing local populations with a resource critical for securing valued trade items. The location was a disadvantage, however, because of the distance from French, Dutch, and later British sources of these goods. It was thus more difficult for these people to trade directly with Europeans, and most of the trade probably flowed through intermediate populations like the Seneca or Huron.

New York. The later sites of the two village sequences postulated by White for the Niagara Frontier date between A.D. 1540-1650. Allen (1988) has suggested that since both communities tended to move in the same general direction, sociopolitical connections can be inferred. The two communities were generally 13-16 km apart. It should be noted that contemporaneous Seneca, Onondaga, and Mohawk communities were separated by distances of the same general magnitude, suggesting that this distance was not random, but rather reflects some as-yet-unspecified requirement of the inhabitants.

The sites following Buffum in the western sequence are the Eaton, Green Lake, Ellis, and Kleis sites. The Ellis and Kleis sites are the latest sites of this community (White 1967) and the most heterogeneous in ceramic assemblages. They have also yielded many fine end scrapers, which may reflect the involvement of the inhabitants in processing pelts for the fur trade, which became of increasing importance to the inhabitants of the Niagara Frontier in the early seventeenth century.

Following the Goodyear Site in the eastern village sequence are the Newton-Hopper, Simmons, and

Bead Hill sites. The Newton-Hopper and Simmons sites are within 3 km of each other in defensible locations along terraces of Buffalo Creek. Bead Hill is located to the south on a gently sloping knoll and has been partly destroyed by road construction, a diner, and trailer park. None of these sites has been totally excavated, and information on the internal structure is generally lacking. The best settlement data come from the Simmons Site, where excavations by Marian White in the 1960s revealed a number of structures.

The Kleis and Bead Hill sites appear to be the last locations of the western and eastern communities, respectively. Unlike most of the earlier locations of these two communities, the sites are not situated on easily defensible terrain. White (1967:3) noted that a similar change from defensible to non-defensible positions occurs in the Seneca area between A.D. 1630-1650 (Wray and Schoff 1953:57). The reason for this change is not apparent.

Ceramics from these sites are often of the Lawson Opposed or Lawson Incised types: grit-tempered vessels with oblique incised lines on the collar. Unlike contemporaneous ceramics from the Chautauqua/Allegheny area, the bodies of vessels are smooth rather than cordmarked. Projectile points associated with the late prehistoric and Iroquoian occupations are isosceles triangular points of the Madison type; many exhibit fine workmanship. Geib (1977:76) noted that Madison points on the Newton-Hopper Site were almost twice as long as wide. The size of these points appears to decrease through time in western New York.

Application of the village-movement model has met with only limited success in the Ripley Site area. A major problem in application of this model is the lack of other presumably contemporary, large sites on the lake plain. This situation has precluded convincingly tying the Ripley Site to a series of village movements. Proponents of the village-movement model, including MacNeish (1952:22), White (1961:128), and Wright (1966:22), have noted the similarity of Ripley material to that from the Goodyear Site in the Niagara Frontier. MacNeish (1952:22) considered Goodyear to be ancestral to Ripley in a village-movement sequence. Wright (1966:89) suggested that Ripley is roughly contemporaneous with the Green Lake Site, another Niagara Frontier site. Carpenter et al. (1949:6) noted "striking parallels" between the ceramics from the 28th Street Site, near Erie, Pennsylvania (see below), and Ripley. Based on examination of glass trade beads, Johnson (Johnson, Richardson, and Bohnert 1979:79) placed Ripley ten years earlier than the 28th Street Site, which he dated to A.D. 1635.

Also in the Chautauqua/Allegheny area, the Silverheels Site in Erie County has abundant trade materials. Some items may have been obtained directly from Europeans, but most were probably obtained from intermediate groups like the Seneca. Unlike the Ripley Site, the Silverheels Site has Seneca-style ceramics, as do the Ellis and Kleis sites in the Niagara Frontier (Schock 1974). The reason for Seneca ceramics on these sites is not clear, but one possible explanation relates to the fur trade. Strengthening of trade relationships through establishment of marriage ties would have been of advantage to both groups at the time.

PENNSYLVANIA. The Winter Green Gorge Site is one of the sites situated on the Portage Escarpment (Widmer and Webster 1981:80). The site is located on a high bluff above Four Mile Creek. A portion of the earth ring surrounding the site can still be seen. Most of the small ceramic sample from the site appears to be McFate Incised, a type common in northwest Pennsylvania and southwestern New York, and one which Murphy (1971c:300) included as a Whittlesey type.

Approximately 32 km southwest of the Ripley Site in Erie, Pennsylvania, is the 28th Street Site. This site has more historic material than Ripley, and may date to the A.D. 1630-1645 period (Carpenter et al. 1949). Like the Ripley Site, the 28th Street Site does not appear to be closely related to other sites in its immediate vicinity, including the latest Whittlesey sites in Ohio.

OHIO. Similar to the Greenwood Phase settlement model proposed by Widmer and Webster (1981), the South Park Phase (ca. A.D. 1500-1650) settlement system includes permanent villages and seasonal camps. The seasonal camps were either small special-purpose campsites located near the villages or aquatic resources, or hunting/butchering stations (Brose 1976a).

The best known example of a village site is the latest occupation at the South Park Site (ca. A.D. 1549-1640). Several longhouses with central interior hearths were oriented in a north-south direction and enclosed by a palisade (Brose 1973:32-35; Widmer and Webster 1981:75). The Tuttle Hill Site (Greenman 1935; Fitting 1966) may also be a South Park Phase village with a configuration similar to that of the South Park Site (Widmer and Webster 1981:75).

The small outlying sites are often fortified and include wigwam structures. The hunting stations are usually located several miles inland on the plateau (Brose 1976c; Widmer and Webster 1981:75).

Examples of these sites include the Fairport Harbor, Lyman, Greenwood (Brose 1976c:40), and Ambler Metro Park #2 sites (Brose 1978c:110).

Later Whittlesey ceramics associated with the South Park Phase are tempered with both grit and shell, and one common type, Tuttle Hill Notched, bears notching on an appliqué strip. A number of investigators have commented on the similarity of this type to various Seneca ceramic types like Seneca Barbed Collar and Dutch Hollow Notched. Projectile points are small and triangular, and shell hoes are common at summer villages. Trade goods dating to the Contact Period were found at the Fairport Harbor Site (Morgan and Ellis 1943), and the material from the latest component at this site is similar to that of the South Park Site (Brose 1976c:39-40).

The Erie and Other Historically Known Tribes (A.D. 1640-1656)

By the mid-seventeenth century, a series of intertribal wars resulted in the defeat and/or displacement of groups living at the eastern end of Lake Erie as the Five Nations Iroquois established control over the area. Among the groups defeated and/or dispersed were the Erie, Neutral, and Wenro. Historic information on these groups is limited, and it is difficult to determine precise territorial boundaries for them.

The Erie were defeated and dispersed ca. A.D. 1654-1656. They do not survive as a group today, and their dispersal took place before there were any European eyewitness accounts. The information available is therefore secondhand and limited, having been compiled by the French in Canada. One of these Frenchmen, Gendron, wrote in A.D. 1644-1645:

> This Lake called Erie, was formerly inhabited on its Southern shores by certain tribes whom we call the Nation of the Cat; they have been compelled to retire far inland to escape their enemies, who are farther West [Gendron 1868:8-9].

The French Jesuits referred to the Erie by their Huron name of Eriehronon (various spellings) or as La Nation du Chat. Wright (1974:63-64) translated the former as "people (-hrono?) at the place of (-ke) the cherry (eri?)." Nation du Chat is usually translated as "the Cat Nation," but as Wright (1974:69-77) and others have suggested, "Raccoon Nation" is probably more likely. The term "chat sauvage" was used in Quebec for raccoons and was also what the Huron called "tiron" which is cognate with the Wyandot "raccoon" (Wright 1974:76-77).

The term Erie, like the term Huron or Iroquois, probably referred to a number of allied groups, each of which may have had one or more villages. We know the names of two of these groups, the Rigueronnons and the Gentaguetehronnons, and their respective villages, Rigue (Thwaites 1896-1901:42:186) and Gentaienton (Thwaites 1896-1901:61:195). This latter reference occurs in A.D. 1679, some 23 years after the defeat and dispersal of the Erie. The name Gentuetehronnons also appears in a list of A.D. 1656 (Thwaites 1896-1901:42:197), and Steckley (1985:12) translated this as "people who bear or carry a field." These names cannot be associated with sites with any certainty (White 1978:412-413), although the 28th Street Site in Erie, Pennsylvania, has often been suggested as the site of Rigue.

White (1978:412) argued that the terms Rigueronnons and Gentaguetehronnons refer to tribes and that Erie "probably referred to a group of tribes, possibly an alliance." They are credited with 2000 or 3000 warriors (Thwaites 1896-1901:42:179), which supports the notion that the Erie were made up of several villages. Another possible Erie group was the Ehressaronon (Heidenreich 1988:101). This name appears in Le Jeune's list of native groups (Thwaites 1896-1901:18:227-239) in a position to suggest they might be Erie. Nothing more is known of them.

Both Gendron (1868:8-9) in A.D. 1644-1645 and the *Jesuit Relations* of A.D. 1647-1648 (Thwaites 1896-1901:33:63) placed the Erie along the southern shore of Lake Erie. A listing of references to the Erie in the *Jesuit Relations* and other sources along with a discussion of cartographic evidence may be found in Marian White's doctoral dissertation (1961), in her 1971 article in *Ethnohistory*, and in her article on the Erie for the Handbook of North American Indians (1978).

Cartographic evidence suggests a location for the Erie along the southeastern shore of Lake Erie during the mid-seventeenth century. An important map for locating native groups in the Northeast prior to A.D. 1650 is that of Novvelle France (Nouvelle France) located at the Ministry of Defense, Tauton, England. Heidenreich (1988) has suggested it was drafted in A.D. 1641 by Jean Bourdon. The Eriehronon are placed south of Lake Erie on this map as they are on the better known and later maps of Nicolas Sanson (A.D. 1650, 1656, 1657). Sanson placed the Erie between the eastern end of Lake Erie and Lake Chautauqua on all these maps, although extending further to the south in A.D. 1656. Whether the Erie occupation extended to the area of Buffalo is uncertain. Later maps (Bernou ca. 1680 in Delanglez

1938:115; Du Creux 1660 in Thwaites 1896-1901:1 and White 1978a; Franquelin 1684 in Delanglez 1943) with the location of the Erie exist, but they were made after the Erie were defeated and dispersed. These maps have sometimes been used to claim a wider geographical distribution for the Erie than western New York.

Both Griffin (1944:192) and Morgan (1952:88) considered Whittlesey Focus material in Ohio and adjacent Pennsylvania to be Erie, and Fitting (1964:170) noted that late Whittlesey sites like South Park and Tuttle Hill may represent one variant of Erie culture while sites like Ripley and the 28th Street Site represent another. Brose (1976c:47, 1988:6) has cautioned against the assumptions that both Whittlesey Focus material and the Erie are to be found along the entire south shore of Lake Erie. He has postulated that the Whittlesey Focus in Ohio is probably distinct from the Erie.

Marian White (1961) located the Erie south of the lake in New York and Pennsylvania prior to their dispersal in A.D. 1654-1656. She believed that the village sites immediately south of Buffalo represented a branch of the Erie, although MacNeish (1952:10) thought some of these sites might be Neutral, and Houghton (1920:39-41) believed the sites to be Wenro. White's identification of the sites as Erie was greatly influenced by the Sanson map.

Gendron (1868:8-9) stated that the Erie were forced to move inland in A.D. 1644-1645 to escape their enemies to the west. White (1972) noted that the disruption of the pattern of village movement in the Niagara Frontier of both the western and eastern villages, with the abandonment of the Kleis and Bead Hill sites, may reflect the event referred to by Gendron. It is also possible that it reflects the defeat and dispersal of the Erie between A.D. 1654 and 1656. White (1972:62) hypothesized that the Erie were forced out of the Niagara Frontier both by the Neutral and the Seneca as these groups sought to exploit the beaver found in the region. More information about these sites and better temporal control are needed to resolve this question.

Other historically known tribes in the western New York area include the Neutral and the Wenro. In the early seventeenth century, the Neutral Confederacy was centered around Hamilton, Ontario, although Neutral groups may have been located east of the Niagara River in western New York for a time in the 1630s and 1640s (White 1972).

The name Akhrakvaeronon appears on the Nouvelle France map east of the Niagara River and was translated by Steckley (1985:13) as the "people of the east." This name is in the same general location as the name Kakouagoga, "nation detruite" on the ca. A.D. 1680 map attributed to the Abbe Claude Bernou and "Rakouegega" on the Franquelin map of A.D. 1684 (Heidenreich 1988:99-100). Steckley (1985:13) argued that these all relate to the same group and that Kakouagoga and Rakouegega is the Seneca or Cayuga name for the Akhrakvaeronon. The Cayuga term for sun is *kahkwa* while Akhrakvaeronon, broadly translated from the Huron as "Easterners," is derived from the Huron word for sun.

Little is known about the Akhrakvaeronon except that they were defeated by the Iroquois in A.D. 1652. Heidenreich (1988:100) has suggested that these were a Neutral group. The name Akhrakvaeronon does not appear on any of the Sanson maps, and the location of their sites is uncertain.

White (1968) suggested that the Van Son Site on the northern end of Grand Island is a Neutral site. This site is a cemetery dating to approximately A.D. 1638-1645. The 59 burials recovered from the Van Son Site were both ossuary and individual burials. The location of the habitation site for this cemetery is unclear. The Burnt Ship Site, a multicomponent site with some ceramics from this time period is only 0.8 km away. Further investigation of the Burnt Ship Site may shed light on the relationship between this site and the Van Son cemetery.

The archaeology of the Wenro, like that of the Erie, presents many problems, since little ethnohistoric information exists. One reference in the *Jesuit Relations* (Thwaites 1896-1901:17:25-27) states that the Wenro were associated with the Neutral and lived to the east of them and about a day's journey from the Iroquois. Another reference places the Wenro beyond the Erie (Thwaites 1896-1901:21:231). This reference has led to suggestions that the Wenro were located in southern New York or Pennsylvania, which seems too far away from the Neutral. Stothers (1979c) suggested that extreme southwestern New York, including the area surrounding the Ripley Site, was the home of the Wenro.

White (1961, 1971, 1978) argued for a location in Niagara or Orleans counties (south of Lake Ontario). Her argument (White 1978:407-411) is based on a reference in the *Jesuit Relations* that in A.D. 1638, 600 Wenro refugees arrived in Huronia from their homeland, having traveled 80 leagues (about 443 km). The Wenro were forced out of their traditional territory by the Iroquois in A.D. 1638, when they joined the Huron Confederacy.

White (1977) suggested that the Shelby Site, dating to the sixteenth century, in Orleans County was

Wenro. The Kienuka and Fort Peace sites in Niagara County probably date to the fourteenth century and may represent earlier village locations (White 1976:131). Another problem concerns the relationship of sites like Kienuka and Shelby to sites immediately to the west in Ontario. Recent salvage excavations on the Thorold Site in Ontario conducted by William Noble from MacMaster University now provide some material for comparison.

A village site that would fit the date of the A.D. 1638 abandonment has yet to be found in western New York. Ridley (1973:10-19) has suggested that the Edwards Site in Simcoe County, Ontario may represent a Wenro site after they joined the Huron. He noted that the ceramics from this site differ from those of surrounding sites, but they resemble those of western Iroquoians in New York State.

THE RIPLEY SITE IN THE CONTEXT OF THE SOUTHEASTERN LAKE ERIE BASIN

From the available information, it is evident that the southeastern Lake Erie Basin is an archaeologically complex region that is not well understood, and contrary to Parker's (1907) assumption, the ethnohistoric evidence cannot easily be tied to the archaeology. Dating for many of the region's sites is not well established, and few sites have received much professional investigation. Whether any of the defined archaeological complexes correlate with historically known native societies remains to be adequately demonstrated, and which of these archaeological complexes may represent the Erie is a question that demands more research. Although the southeastern shore of Lake Erie continues to be considered by many scholars as the homeland of the Erie, information about the Erie is very scant.

At the present time, the culture history of late prehistoric and early historic times in the southeastern Lake Erie Basin is just a bare outline into which the Ripley Site can only crudely be fitted. The region does appear to be a natural laboratory for examining questions related to interaction spheres between the resident populations, neighboring Iroquoian groups, and the late cultures of the Upper Midwest. Both environmental and cultural characteristics strongly suggest this area played a key role in relationships between the better known "culture areas" to the east and west. These characteristics include the ready transportation route offered by Lake Erie, the strategic positioning of the area on the divide between the Mississippi and St. Lawrence drainages, the presence of many late prehistoric earthworks, including mounds and enclosures (cf. Cheney 1859; Edson 1875; Larkin 1880; Thomas 1894; Turner 1850), and the occurrence of shell-tempered as well as Iroquoian pottery varieties (Guthe 1958; Schock 1974, 1976).

The nature of these interactions is unknown, and this important question cannot be explored effectively until more basic questions regarding settlement patterns and temporal relationships are better delineated. Not only is the relationship of the Ripley Site to the Niagara Frontier area, the Whittlesey sites of northeastern Ohio, or the few Lake Plain Erie sites of Pennsylvania unclear, even placing the Ripley Site into a localized settlement/subsistence context is difficult at present because the relationship of nearby sites, such as the Westfield Site (Guthe 1958) and Silverheels (Schock 1974), is not understood. It also is evident that a better understanding of the Ripley Site itself is necessary for placing it in a regional context. Questions surrounding the nature of earthwork sites have not been given serious evaluation, and issues of site function or seasonality have rarely been addressed systematically in this region.

CHAPTER 4

HISTORY OF INVESTIGATIONS

Lynne P. Sullivan, Eleazer D. Hunt, and Richard G. Wilkinson

A succession of amateur and professional archaeologists have excavated, probed, surface collected, shovel tested, and plowed the Ripley Site in an attempt to recover artifacts and learn more about the former inhabitants. This chapter summarizes the history of investigations at the Ripley Site from early historical notations to collectors' activities in the 1980s, and provides detailed descriptions of three major unpublished excavations conducted by M. R. Harrington in 1904; a local farmer named Jordan Christensen in 1957-1959; and a group of four amateurs, headed by Carlton Conklin, in 1962-1965.[2]

A portion of the information in this chapter was gathered through interviews with collectors, artifact dealers, amateur archaeologists, and residents of Ripley, New York (Hunt 1988). These interviews provided insights about the kind and variety of work that has taken place at the Ripley Site and resulted in more complete information on collectors' activities and a more thorough history of land use. The interviews also provided additional data about the kinds of artifacts and features present at the site.

Due to their unsystematic nature, surface collection activities at the site will never be fully understood. Nonetheless, the value of conducting collector interviews as part of a study of existing collections is apparent. Such interviews are especially useful for a more comprehensive inventory of the range of materials occurring at a site and for assessing the amount of damage a site has suffered.

CHRONOLOGY OF INVESTIGATIONS

The first account of the Ripley Site located to date is a statement given by George Morse, a Ripley resident, in the 1820s (McKutchen n.d.). Morse described the conditions of the earth ring, early removal of artifacts from the site, existence of a possible burial mound, and erosion of the bluff face. Morse's account of the site is as follows:

> It [the earth ring] was breast high, and covered with a second growth of whitewood woods. All around the circle, several rods from the edge, was the primeval forest, which was cleared away ... To be precise, I remember that the ring was not complete, for the two ends, like the letter "C," touched the lake bank.
>
> Since the earliest days, relics have been carted away. When the stumps were pulled and wherever the grub hoe struck, arrows and "skinning stones" would come to light. Sometimes Indian crockery, in pieces as big as your hand and bigger, would be found ... My father planted corn there in 1826, and he plowed and dug it [the earth ring] level. There was a stone mound covered with earth there. My brother dug into it, but did not dig deep enough ... Finally the bank caved off, ([the bank] caves off every spring, a good deal), and a part of the mound fell into the water. Then when we looked at it, we saw a skeleton exposed under it. Shortly, the entire mound went over into the lake [McKutchen n.d.].

No excavations are known to have taken place during the remainder of the nineteenth century, but removal of artifacts by local collectors and curiosity seekers must have continued. The location of the Ripley Site was recorded during this period and was well known to antiquarians (Edson 1875). The beginning of the twentieth century marked the beginning of the first recorded intensive and systematic excavations of the site. The first such excavation was conducted in 1904 by Mark R. Harrington of the Peabody Museum at Harvard University. Harrington concentrated his efforts on the western portion of the site where he identified 70 pit features, of which 31 contained burials. Harrington did not publish a report of these investigations. The collections from Harrington's work at the Ripley Site are curated by the Peabody Museum of Archaeology and Ethnology at Harvard University. The original field notes are on file at the New York State Museum.

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[2] Subsequent to the writing of this chapter, Conklin's report of his 1962 excavations was published in *The Iroquoian*, No. 16, Lewis Henry Morgan Chapter of the New York State Archaeological Association, Fall 1989.

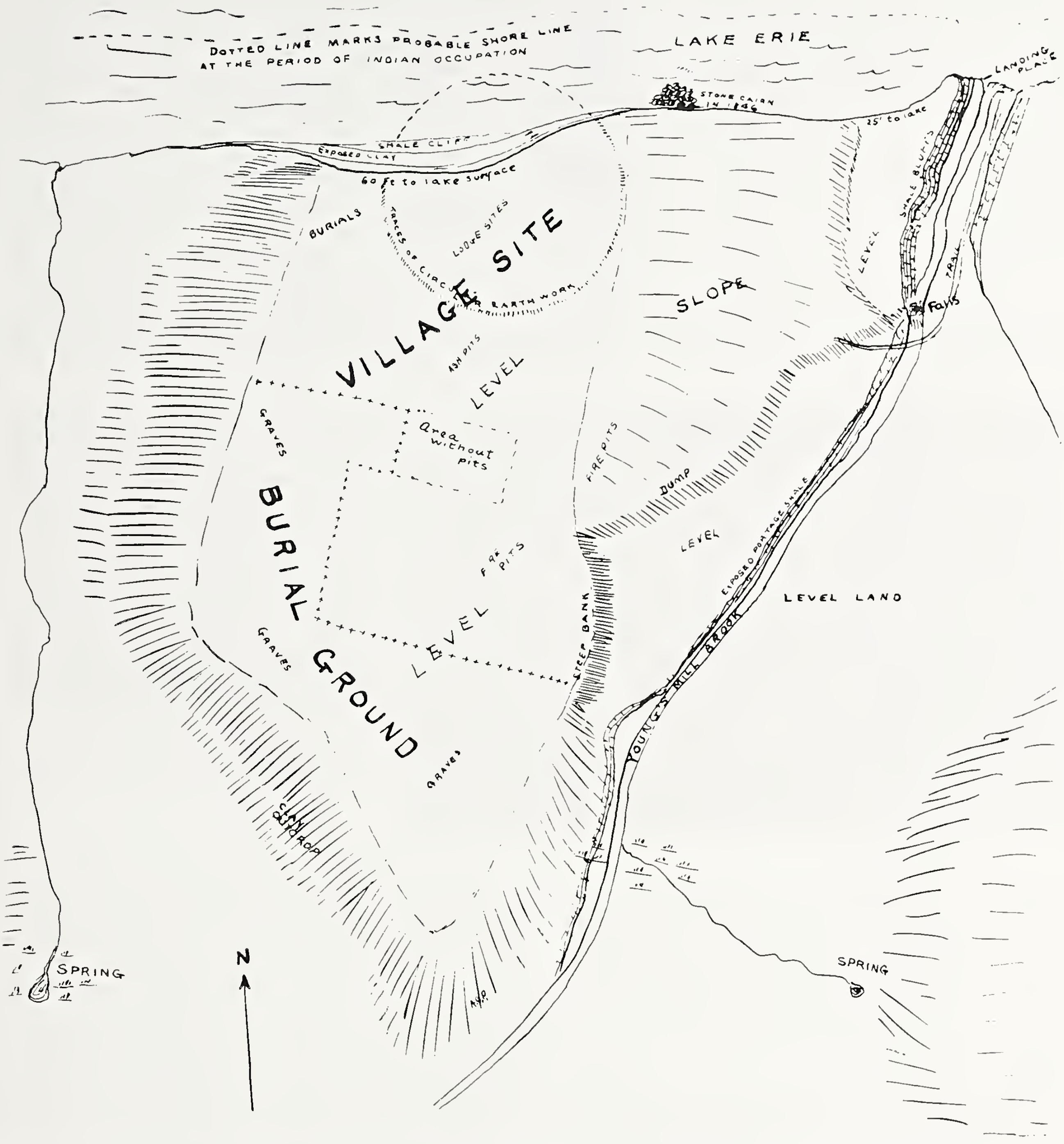

Figure 4.1 Parker's map of the Ripley Site showing the "stone mound." This map shows slightly different details than the one published in Parker's 1907 report.

Two years later, Arthur Parker began his excavations, which covered considerably more area than Harrington's 1904 work. Parker's excavations exposed a large section of what he called the village area and a concentration of burials on the knoll's south end. Parker (1907:Plate 3) produced the first comprehensive map of the site, highlighting the location of the earth ring, individual burials, and pit features. A map slightly different than that published in his 1907 report was found on file at the New York State Museum (Figure 4.1). This map indicates that Parker knew about the "stone mound" described by Morse and that it existed on the bluff edge as late as 1846. The map also suggests

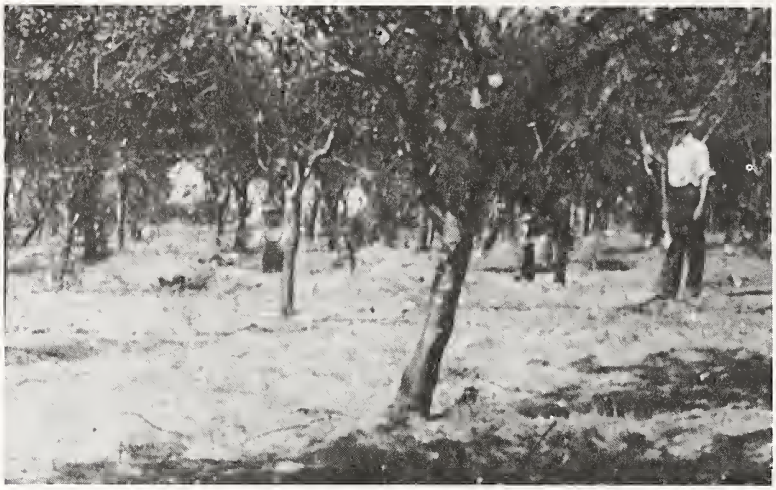

Figure 4.2 Photo of Parker's excavations. Note the orchard. Parker is shown standing in the right side of the photo. An unidentified worker is standing in a trench near the center of the photo.

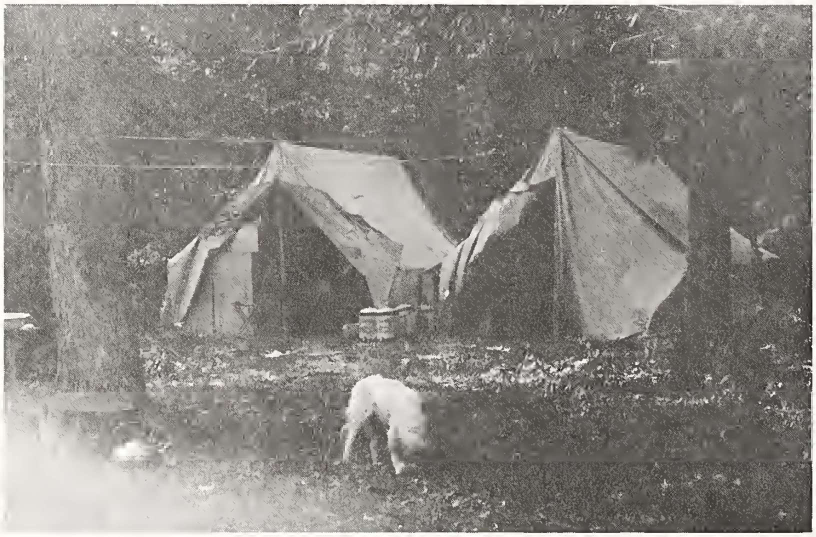

Figure 4.3 Parker's field camp at the Ripley Site. Parker's site map in his 1907 report shows the camp location as on the point of land just above the "landing place" on Figure 4.1.

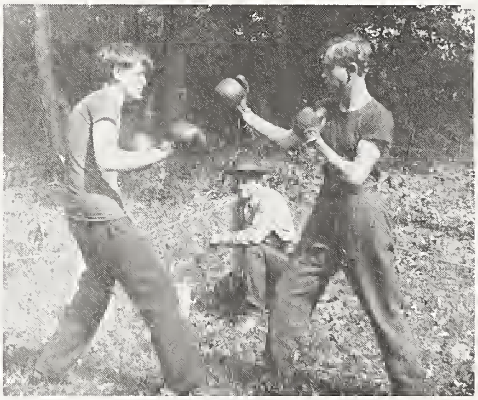

Figure 4.4 Camp life during Parker's Ripley Site investigations. Shown from left to right are Everett Burmaster, A.C. Parker, and Jesse Mulkin.

that Parker knew that burials were located west and south of the earthen ring. Since this is generally the area investigated by Harrington, this information must have come from him. Parker excavated 101 graves, at least 42 pit features, and at least one possible "lodge site." His map and description of this lodge are very cursory.

Some additional information about Parker's work is related in the autobiography of one of his crew members (Burmaster 1955) and by a local eyewitness to Parker's work, Paul Johnson. Everett R. Burmaster, his friend Jesse Mulkins, and a Seneca man named Blue Sky were Parker's three field hands (Burmaster 1955). Burmaster explained that as part of the agreement with the landowner, Parker was to remove the orchard that covered the site. This interpretation is somewhat different than Parker's account in that he, like Harrington, described excavating trenches between the rows of fruit trees. The trenches between the trees are visible in a photograph of the Ripley Site excavations found in the files of the New York State Museum (Figure 4.2). Johnson remembered the trenches between the fruit trees and noted that if a feature was located under a tree or in the side wall of the trench, the excavators would undercut the wall to remove the feature's contents. Parker (1907:476) made note of this procedure in his report, adding that "this was a somewhat dangerous operation as sometimes the overlying sand would cave down and engulf the curious but incautious archaeologist who after a time would be rescued by his assistants." Burmaster (1955) also described details of camp life (Figures 4.3 and 4.4), including a visit from A. B. Skinner that ended with Blue Sky pushing a tent into the creek in the middle of the night, as a means of ending the party. The collections and records from Parker's investigations are curated by the New York State Museum. A summary of Parker's archaeological career can be found in Sullivan (1992).

Following Parker's excavations, the site did not receive attention from professional archaeologists for nearly 50 years, but local informants indicated that during this period artifacts were continually removed. A local folktale in the Ripley area is that Everett Burmaster made pocket money to pay for a weekend's entertainment of baseball and beer by excavating artifacts and selling them in the towns along the trolley route.

Another account of Burmaster's work at the Ripley Site is given in the New York State Museum's annual report for 1908. The report states that Burmaster,

> a field assistant ... opened several graves in a portion of the site where burials had not been hitherto found. Among the valuable specimens are several crushed pottery vessels, a fragmentary turtle-shell rattle, a bone comb, bone beads and several skeletons. The bone comb is of the early fork type and has three teeth only. The turtle-shell rattle was plainly visible in the grave and contained a handful of gravel stones. When taken up the carapace fell apart [Clarke 1909:57].

A sketch and description of a grave matching this published description was found on file at the New York State Museum. The handwriting appears to be Burmaster's, but there is no other identifying information on the single page of notes. The grave contained the remains of an adult male, adult female, and a child. All three skeletons were flexed with heads oriented to the south. The adult male lay on his left side, and the female and child, each on their right. The bone comb was situated above the male's head, and the turtle rattle and a bone bead were near his shoulder. Two pots and a bone awl were placed between the adults, and one pot was near the female's skull. Near the child's pelvis were several bone beads. One pot attributed to Burmaster's excavations and the bone comb are in the collections of the New York State Museum.

In 1952, a small excavation was conducted by Alfred Guthe, who then worked for the Rochester Museum of Arts and Sciences, now the Rochester Museum & Science Center. Guthe placed 5 trenches in the central portion of the site (Figure 4.5). These excavations revealed about 20 post molds and 4 pit features. A small collection, mainly of pottery sherds, from these excavations is curated by the Rochester Museum & Science Center.

From 1950 to the present, at least a dozen persons are known to have surface collected the Ripley Site. Information about their collections, ranging from 1 to nearly 1000 items, is on file at the New York State Museum. The largest collection was made over a period of some 40 years by a local antique dealer. This individual collected every year that the site was plowed and took every visible artifact on the surface.

In 1957, Charles Conley, the landowner at the time, allowed a Pennsylvania farmer named Jordan Christensen to excavate the site in exchange for clearing the scrub growth on the western half of the knoll. Having read Parker's report, Christensen concentrated his efforts on graves and excavated 54 burial features. No report was made of these investigations, but the artifact collections, some of the skeletal material, and the field notes (Christensen 1957-1959) have remained intact and were donated by Mr. Christensen to the State Museum.

In 1959, John Weber, an amateur who was later involved with more extensive excavation of the site, found a grave eroding from the bluff. Some of the bones and grave goods had already fallen into the lake. He retrieved a hammerstone, a copper tube bead, a celt, a bone comb drilled with 3 holes, a long-stemmed, white chert knife, and what is described

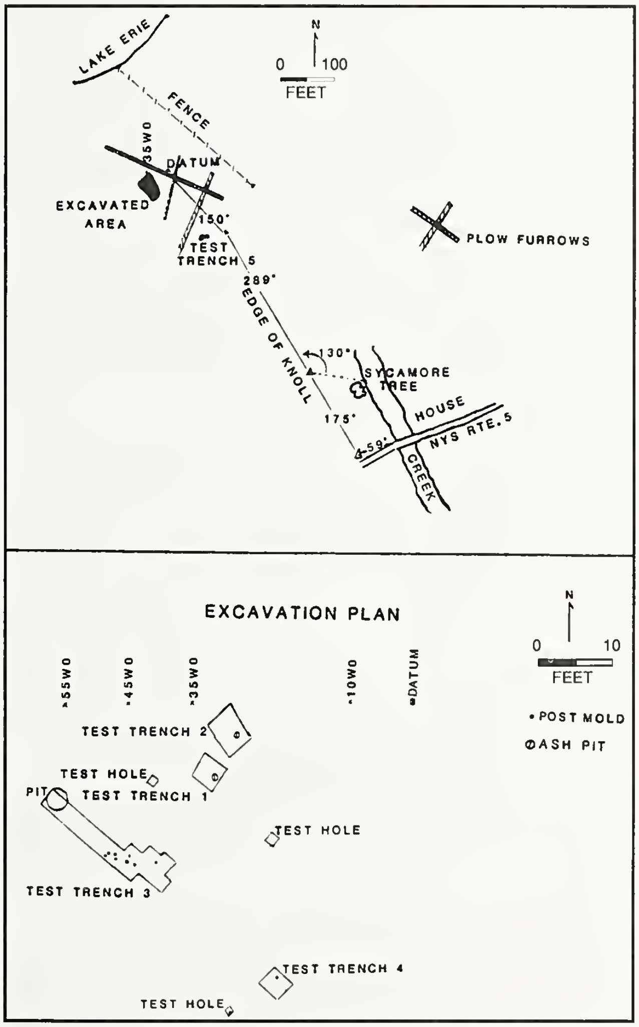

Figure 4.5 Guthe's map of excavations at the Ripley Site. Redrawn from the original map on file at the Rochester Museum & Science Center.

as a "piece of zinc" (Conklin 1962). The whereabouts of these materials are unknown.

Cultivation of the site allowed surface collecting to continue after 1959. Between 1960 and 1966, several of the county's more prodigious collectors visited the site. From 1962 through 1965, the site was excavated by a group of four amateur archaeologists, C. Conklin, W. Wheelock, J. Weber, and G. Schmahl. They concentrated on the eastern side of the site and used probes to locate features. They excavated at least 66 burials and 52 pit features. A report of the 1962 investigations was prepared by C. Conklin (1962).

The collections from these investigations were split four ways among the amateurs. The integrity of these collections has not fared well. The materials have been sold, resold, and the proveniences removed from many items. Portions of the collections are currently curated by the Rochester Museum & Science Center and the Marian E. White Museum of the State University of New York at Buffalo.

Between 1963 and 1988, the site was surface collected by several individuals. Interviews revealed that by 1980 a renewed interest in the site developed. A new generation of collectors began to walk the field each spring and fall. Between 1980 and 1986, at least 480 artifacts, excluding body sherds, were removed from the site. These artifacts represent material from only three collections and undoubtedly constitute only a fraction of the artifacts removed during this time. Regular collection of the site by at least two individuals continues to the present, and despite efforts by the present landowners, potholes are occasionally dug.

During the summer of 1988, a collaborative field school between the New York State Museum, Indiana University of Pennsylvania, and the State University of New York College-Fredonia conducted test excavations at the Ripley Site. The goals of the excavations were to determine whether intact deposits were present at the site and to assess the remaining potential of the site to yield new information through excavations using modern professional techniques. Specific objectives were (1) to locate the proposed habitation area and determine the degree of preservation; (2) to collect representative samples of artifact classes not systematically recovered during past excavations through use of finer scaled excavation techniques; and (3) to generate representative samples of subsistence data through the collection and processing of flotation samples.

An initial reconnaissance of the site in the summer of 1987 indicated that distances on Parker's 1906 map of the site were not accurate and that continuing erosion on the bluff face had reconfigured the northern end of the knoll. To increase the likelihood that excavations would encounter the habitation area, electrical resistivity was used to test a 20 m by 40 m section of the site in the general area indicated by Parker to be the village. Funding limitations prevented sampling a larger area at this time.

Trend-surface analysis of the resistivity data revealed a series of roughly linear patterns. These patterns were defined by alternating bands of higher and lower resistivity (Hasenstab 1988). As a test of these results, one linear pattern of high resistivity and one linear pattern of low resistivity were selected for excavation. In general, the test excavations in areas of high resistivity did not contain many features beneath the plow zone, nor did these areas contain evidence for in situ burning. Test excavations in the areas of low resistivity revealed the presence of a number of features including a linear pattern of vertical post molds.

An additional 32 m^2 were excavated in the area of the post-mold pattern to define the possible structure and expose additional features. The line of post molds was 8.5 m long within the excavated area and undoubtedly extended beyond the excavation borders. No corners were discovered. Assuming that this row of post molds represents a structure wall, it is unclear which side would have been the structure's interior. Few post molds were discovered in excavation units adjoining those containing the line of posts. Features excavated on the northeast side of the wall included several shallow, ash-filled pits and one large pit containing one half of a ceramic vessel. Features excavated on the southwest side of the wall include one hearth-like feature containing burned earth and ash, and one earth-oven type feature with charcoal, burned earth, and fire-cracked rock. Two radiocarbon dates [710 ± 110 B.P.; cal A.D. 1219-1331 ($p = .69$) and cal A.D. 1344-1394 ($p = .31$) (Beta 29940); and 620 ± 110 B.P.; cal A.D. 1284-1416 ($p = 1.00$) calibrated at 1 sigma (Beta 29941) (Stuiver and Reimer 1993)] obtained from charcoal samples recovered from post molds in this area (Sullivan, Neusius, and Neusius 1995) raise questions concerning the occupation span of the site (cf. Parker 1907).

Excavation efforts were also directed toward the periphery of the knoll to better determine the site boundaries. Local informants who worked at the site in the past indicated the presence of a "palisade" still visible along the perimeter of the knoll. A distinctive berm was noted on both the east and west boundaries. Test excavations indicated that both were created by recent wind deposition and downslope movement resulting from plowing of the site over the last century. The 1988 excavations did not reveal any indications of a palisade, although it was determined that more work would be needed to resolve this question.

Shovel probes excavated at 10-m intervals in a wooded area on the east side of the knoll revealed what appeared to be a midden deposit about 40 m from the lakeshore along a steep bank formed by the creek. This deposit began approximately 6 m back from this bank and increased in depth to the south and west. Along the edge of the bank the deposit was as much as 60 cm thick. Preservation within the midden was excellent and provided a valuable sample of floral and faunal material.

Analysis of the materials from the 1988 excavations is ongoing. Screening of excavated sediments through quarter-inch mesh and flotation of samples from all contexts, except some plow-zone units, produced a large amount of artifactual debris and small-scale subsistence remains. A detailed report of these investigations will appear in a future publication, although preliminary analyses of the recovered faunal and lithic materials are discussed in Chapters 6 and 7. One data category recovered in 1988, for which little material existed in the previous collections, is botanical specimens. While sorting of the flotation samples is in progress, Bodner (1989) has identified the only tobacco seeds documented to date from an archaeological context in the state of New York from a pit feature at the site. This discovery serves to indicate the general lack of available data from flotation analyses from the region.

THE HARRINGTON EXCAVATIONS

Mark R. Harrington worked at the Ripley Site from July 23 to September 17, 1904. The site was then owned by William Young. Judging from his notes and map, Harrington's techniques were similar to those used by Arthur Parker (1907:478-480). Trenches were staked out across the site, and workmen began the excavations by removing soil (presumably that of the plow zone) from a section of a trench. The excavated soil was thrown to the sides of the trench. According to Parker,

> The archaeologist examined this cross-section and if indications pointed to the probable presence of objects he troweled into the bank, allowing the earth to fall to the floor until it had filled where it was removed by a laborer [Parker 1907:478].

Work continued in this manner until nothing more of interest was found in a trench.

Pit contents were carefully troweled to look for objects, and "all the important specimens" (Parker 1907:478) were labeled. The "refuse" material such as animal bones, debitage, potsherds, and "rude" implements were placed in labeled bags (Parker 1907:478). Proveniences for specimens from other than pit contexts were recorded as from "general diggings." Artifact recovery through screening of

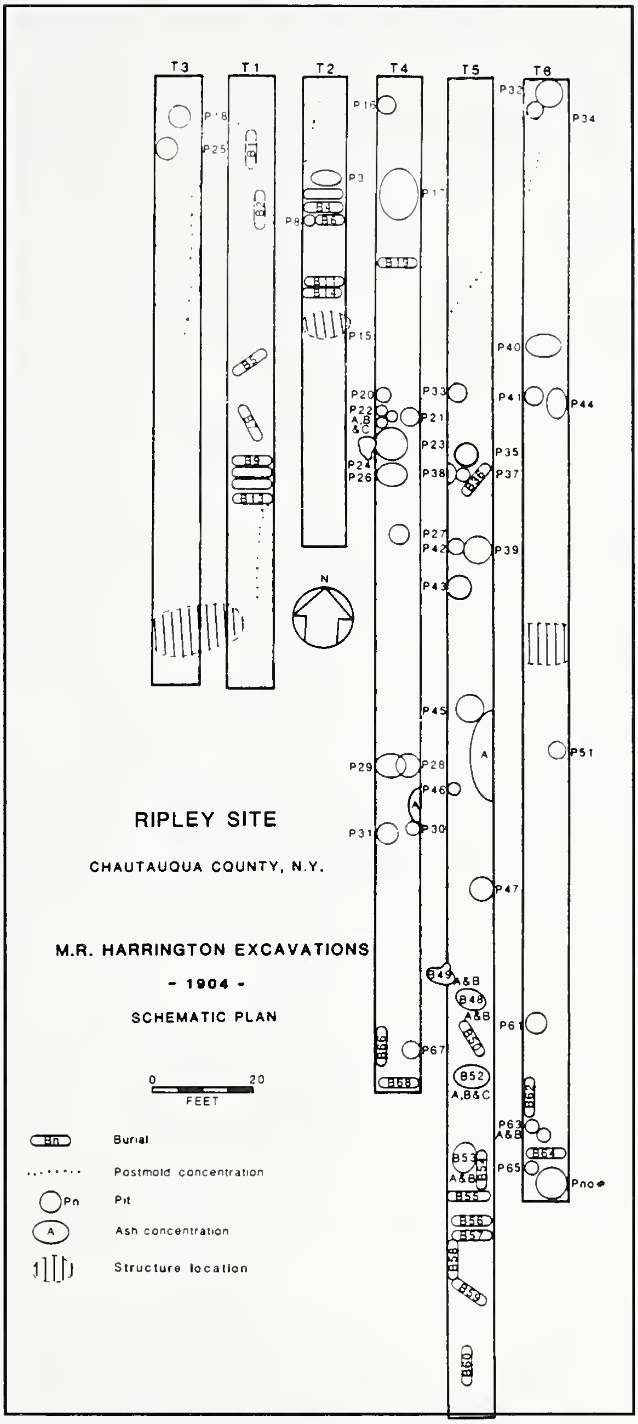

Figure 4.6 Map of M. R. Harrington's excavations. Redrawn from the original on file at the Peabody Museum of Archaeology and Ethnology, Harvard University.

TABLE 4.1. DIMENSIONS OF PIT FEATURES EXCAVATED BY HARRINGTON.

Trench-Pit Number	Dimensions		Comments
	Diameter	Depth	
II-3	3.5 ft	20 in	near middle of trench
II-8	4 ft	20 in	ash pit
II-15	10 ft	24 in	house site?
IV-16	30 in	8 in	
IV-17	8 ft long x 6-7 ft wide	2.5 ft	irregular shape
III-18	28 in	30 in	east side of trench
IV-20	2 ft	21 in	west side of trench
IV-21	3.5 ft	26 in	east side of trench
IV-22	irregular		3 pits fused together; west side of trench
IV-23	8.5 ft long x 6.5 ft wide	32 in	west side of trench
IV-24	28 in maximum	25 in maximum	pear shaped; protruding from west side of trench
III-25	?	24 in	east side of trench
IV-26	6.5 ft	22 in	
IV-27	2 ft	22 in	
IV-28	5 ft	45 in	bowl shaped
IV-29	4 ft long x 6 ft wide	38 in	oval shaped; adjoining west side of Pit 28 with grey ash
IV-30	2 ft	18 in	
IV-31	3 ft	20 in	east side of trench
VI-32	45 in	31 in	
V-33	34 in	46 in	narrow, deep pit; filled
VI-34	36 in	24 in	
V-35	6.5 ft	25 in	6 in deep ash-filled depression at one side of bottom
V-37	3.5 ft	25 in	middle of trench
V-38	irregular	16 in	west side of trench
V-39	7 ft	32 in	projecting from east side of trench
VI-40	35 in	35 in	
VI-41	30 in	34 in	
V-42	36 in	36 in	pot-shaped pit; middle of trench
V-43	3-3.5 ft	34 in	pear shaped; west side of trench
VI-44	60 in	30 in	
V-45	5 ft	4.5 ft	pot-shaped; much ash
V-46	18 in	17 in	west side of trench
V-47	3.5 ft	26 in	pot-shaped; east side of trench
VI-51	1.5 ft	2 ft	
VI-61	n.d.	n.d.	west side of trench
VI-63	18 in	2 ft	west side of trench
VI-65	irregular	20 in	west side of trench
VI-67	2 ft	20 in	east side of trench
No number	6 ft	18 in	

n.d.: no data available

the soil was not undertaken, nor was screening a common recovery technique in the early twentieth century. Typical of archaeologists in the early part of the century, Harrington did not use standardized forms for recording attributes of encountered features. Instead, all information about the excavation was written in a notebook kept by Harrington.

A sketch map in the back of Harrington's original field notebook shows the general placement of his excavations on the knoll. Harrington's original map of the plan of the excavations is on file at the Peabody Museum at Harvard University. Figure 4.6 is a drafted version of this map. At the time, a plum orchard covered a large portion of the site. Harrington placed six trenches between the rows of fruit trees, which extended generally northwest and southeast across the knoll. The trenches began near the bluff edge and were approximately 9 to 9.5 ft in width and of varying lengths. Trench 3 was located along the western edge of the knoll, and Harrington (1904) commented that this trench "seemed to run through part of the village refuse heaps."

Distances to encountered features were measured from the beginning of the appropriate trench. Harrington also provided descriptive information that often includes feature dimensions, orientations, and types of recovered artifacts. Other than the distance from the beginning of the trench, the placement

Table 4.2. Contents of Pit Features Excavated by Harrington.

	Material Category						
Pit No.	Chipped Stone	Ground Stone	Pottery	Bone/Shell Artifacts	Bone/Shell Refuse	Pipes	Other
3	debitage*	———	sherds*	———	animal bones*	———	charcoal*
8	debitage*	———	sherds*	worked elk phalanx	animal bones*	———	———
15	projectile point*, implement*, scraper*	———	sherds*	shell bead	———	2 fragments*	———
16	2 projectile points*, drill*	———	sherds*	bone bead*	animal bones*	———	charcoal*
17	projectile points*	———	sherds*	cut beaver tooth	animal bones*	———	charcoal*, acorns*
18	———	———	———	2 bone beads*			
20	———	———	sherds	2 fish hooks	animal bones	———	———
21	———	———	sherds*	bear canine*, dog jaw*	animal bones*	———	———
22	12 preforms	hammerstone, stone, pitted cobble	———	2 perforated dog teeth, bear skull fragments	———	———	baked clay
23	projectile point perforator	etched stone	———	bone bead	2 unios	stem, clay	corn* charcoal*
24	———	———	sherds	worked antler, perforated elk tooth	unio, animal bones	———	iron ore*
25	———	———	sherds	———	animal bones*	———	———
26	———	flat stones	———	2 bone beads, perforated dog tooth	animal bones*	rim fragment	human tooth*
27						sherds	
28	projectile point*	celt*, 2 mortars*	———	———	———	———	———
29	6 rejects	perforated stone, 3 pebbles, hammerstone	sherds	shell bead, bone bead	animal bones	clay, bowl	———
30	———	———	sherds	2 antler flakers, bone bead	———	———	———
31	———	———	sherds*		animal bones*	———	charcoal
32			sherds*	bone bead*	animal bones*		
33	———	———	———	bear tooth*, bear jaw*, cut bone*, beaver tooth*	———	———	corn*
34	———	———	sherds*	bone bead*	———	———	———
35	projectile point, reject	———	miniature pot	bone perforator, bone bead*	———	clay, fragment	wood*, corn*
37	———	———	sherds	bone needle*, bone awl*, worked shell*	animal bones	———	baked clay*
38	2 projectile points, rejects	———	sherds	bone bead, flaker	animal bones, univalve shells,	———	———

continued on next page

TABLE 4.2.— *continued*

	Material Category						
Pit No.	Chipped Stone	Ground Stone	Pottery	Bone/Shell Artifacts	Bone/Shell Refuse	Pipes	Other
39	12 projectile points, 10 rejects, 3 scrapers, 2 projectile points*, drill	3 hammerstones	sherds	6 bone perforators, 3 antler fragments, worked turkey spur, worked phalanx, perforated dog tooth, worked tooth, 9 bone beads, needle fragment	unio univalve and unio shells	clay, stems; stone pipe	———
40	———	celt fragment*	———	perforated elk tooth, bone bead*	animal bones*	clay, stem	———
41	———	———	sherds*	———	———	———	———
42	knife, rejects*, projectile point*	———	sherds	dog jaw bone perforator, bone tool*, game bone*	unio	———	———
43	7 projectile points	———	———	bone perforator, elk antler*	univalve shells	———	———
44	———	pitted stones*	———	bone awl*, bone bead*	———	———	wood*
45	11 projectile points*, 4 scrapers*, rejects*, drill*	celt*	sherds, 2 dolls*	antler handle, worked antler, 3 antler flakers, 4 bone beads, perforator, 2 worked deer phalanx, worked elk phalanx	animal bones, shells*	clay, stems	corn, baked clay*, fruit pits, squash stalk*
46	———	———	sherds*	bone awl*, gaming bone*	———	stone pipe	———
47	scraper, 4 rejects	polisher	sherds	———	animal bones	———	corn cobs
51	———	———	———	bone needle, bone awl, bone projectile point*	shell	———	clay pipe
61	projectile point*	———	———	———	animal bones*	———	———
63	drill, rejects	———	sherds	bone awl	animal bones	———	red paint*
65	projectile point*	———	———	antler flaker, bone perforator	———	stem*	———
67	drill*	sandstone slabs*	sherds*	———	animal bones*	———	———
No number	———	———	———	bone awl*	———	———	———

* These objects are not cataloged for the indicated provenience in the Peabody Museum's collections, but are described in Harrington's field notes.

TABLE 4.3. BURIALS EXCAVATED BY HARRINGTON.

Trench-Pit Number	Depth Below Surface	Sex	Age	Orientation	Comments
I-1	8 in	M	35	n.d.	hit by plow
II-2	6 in	**	—	n.d.	
II-3	14 in		"infant"*	n.d.	no pit described
II-4	21 in	?	1.5	east	
I-5	12 in	F	21	southwest	
II-6	35 in	F	29	east	
I-7	16 in	F	22	east	hit by plow
I-9	17 in	F	38	east	
I-10	24 in		"infant"*	n.d.	
II-11	30 in	F	26	east	
I-12	20 in	?	1.5	n.d.	
I-13	23 in		"child"*	east	
II-14	12 in	?	10	west	
IV-19	3 ft	F	16	east	
VI-36	17 in	?	2	northeast	eastern side of trench
V-48	3 ft 4 in	F	50	east	2 skeletons
		F	16		
V-49	n.d.	F	50	west and northeast	apparently 2 intersecting or 1 irregular pit; 2 skeletons
		? (M)	7		
V-50	3.5 ft	M	26	southeast	
V-52	5 ft	M	37	east	middle of trench; 3 skeletons
		F	25		
		fetal			
V-53	3 ft	A:F	40	south	3 skeletons
		B:M	41		
		C:F	22		
V-54	4 ft	M	24	south	
V-55	37 in	M	31	east	middle of trench
V-56	28 in	**		west	only skull fragments saved
V-57	40 in	F	46	east	
V-58	30 in	F?	11	south	west side of trench
V-59	40 in	**		southeast	
V-60	26 in	F	26	south	
VI-62	30 in	**		south	
VI-64	18 in	neonatal		west	
IV-66	3 ft	M	43	south	west side of trench
IV-68	38 in	F	adult	east	east side of trench
		infant			infant in pelvic area of female

n.d.: no data available
* Age as reported by Harrington; skeletal material not identifiable except for the remains of a 3-year-old child.
** Provenience lost. Three skeletons exist, but they cannot be positively associated with the trench and pit designations. The three are an adult male, an old adult male, and a third male of 50+ years.

of the features within the trenches is not recorded in measured distances. Occasionally the field notes and plan map differ in placement of features with regard to the side of the trench on which the feature occurred (i.e., east vs. west).

Harrington's map indicates the location of at least four oval-shaped structures. His field notes provide little description of these features, which he usually mentioned as concentrations of "picket holes." Harrington did note, however, that the post-mold concentrations at the south ends of Trenches 2 and 3 and near the center of Trench 6 were possible "lodge or house sites" and drew them as oval-shaped structures on his site plan.

Harrington assigned numbers to 68 features. One large pit at the end of Trench 6 was not assigned a number. Two numbered features (Pits 22 and 63) were actually more than one pit in close proximity. Thirty-one of the features were burial pits, containing a total of 36 individuals. Harrington also noted several ash concentrations which were not assigned numbers.

Tables 4.1 and 4.2 summarize information about the form and contents of the pit features excavated by Harrington. Tables 4.3 and 4.4 provide descriptive

TABLE 4.4. ARTIFACTS ASSOCIATED WITH BURIALS EXCAVATED BY HARRINGTON.

	Material Category						
Pit No.	Chipped Stone	Ground Stone	Pottery	Bone/Shell Artifacts	Bone/Shell Refuse	Pipes	Other
1	projectile point	—	pot	—	—	—	—
2	—	—	—	—	—	—	—
3	—	—	—	—	—	—	—
4	—	—	—	—	—	—	—
5	—	—	pot	bone fish hook	—	—	red ochre
6	flint knife	—	pot	—	—	—	—
7	—	—	pot	—	fish bones inside pot	—	—
9	—	—	pot	—	charred deer bone inside pot	—	—
10	—	—	—	—	—	—	—
11	—	—	—	—	—	—	—
12	—	—	pot	—	—	—	charred layer beneath skull (bark?), 2 brass beads
13	—	—	pot	—	—	—	—
14	—	—	—	—	—	—	—
19	—	—	sherds	bone bead shell bead	animal bone	—	charcoal
36	—	—	—	—	—	—	—
48	—	—	sherd	shell bead	univalve shell		red ochre
49	—	net sinker	—	—	—	—	—
50	10 projectile points, 2 knives, drill, blade, debitage	celt smoothing stone	sherd pot	2 claws antler flaker bone spatula	2 shell fragments fish bone	—	charcoal, corn, red ochre, iron blade
52	projectile points, debitage	mortar, "pitching tool," slab	pot	bone awl, bear bone fragments, antler flaker	bone fragments	—	squash seeds inside pot, red ochre pebbles
53	projectile point	—	pot	elk antler hoe, 2 large turtle shells, bone awl, bone implement	—	— inside turtle	shells, glass beads
54	—	—	pot	—	univalve shell	—	red ochre
55	—	—	—	—	—	—	—
56	—	—	—	—	—	—	—
57	—	—	pot	—	—	—	—
58	—	—	—	—	—	—	"paint"
59	7 projectile points, debitage	—	pot	large perforated antler implement	—	—	red ochre, "black paint"
60	—	—	pot	—	—	—	—
66	2 projectile point	—	—	—	—	—	projectile point in lumbar vertebrae, wood
68	—	—	—	—	—	—	—

information about the burials and associated artifacts. The artifact descriptions in Tables 4.2 and 4.4 are taken from Harrington's notebook and the Harvard Peabody Museum catalogue. Harrington's notes include descriptions of artifacts that do not correspond to the indicated provenience in the museum catalogue. Thus, it was not possible to construct a comprehensive listing of the artifacts using more precise descriptions. Richard Wilkinson examined the skeletons at the Peabody Museum during the summer of 1989 and compiled the age and sex information in Table 4.3. The ages reported by Wilkinson for the skeletons are, in the cases of adults, within range values; that is, a skeleton whose age at death was determined to be 30-35 was given a specific age within the interval. The specific age assigned approaches either end of the range to the extent suggested by the indicators of age. The age indicators used are the traditional macroscopic observations of dental development and attrition, epiphyseal status, suture closure, and pubic symphysis morphology. It should be understood that the absolute age values reported here do not imply this level of exactitude, but are instead used as shorthand for the normal 5- to 10-year intervals. A more detailed discussion of the Ripley Site skeletal population is presented in Chapter 8.

THE CHRISTENSEN EXCAVATIONS

Jordan Christensen began excavation and collection of the Ripley Site in 1957 and continued work for three years. As mentioned above, Christensen concentrated on burial excavation. At the time, a north-south fence line bisected the site and formed the eastern limit of Christensen's investigations. To the east of this fence was pasture, and to the west was an area of brush. After clearing the brush, Christensen plowed the western area with a one-bottom plow set deeper than usual to expose stains in the subsoil. The field notes (Christensen 1957-1959) suggest that the whole area was not plowed at one time; instead small portions were plowed, and the features found and excavated.

After plowing, the furrows were walked to identify feature stains. The stains were flagged, and the locations were mapped. Christensen apparently relied on Parker's 1907 report as a guide for his excavation techniques. Shovels, hand tools, brushes, and small picks were used for excavating. Screening of feature fill was not routinely done, although the records indicate that one feature was screened. Once exposed, each feature was described, photographed, and the artifacts removed and labeled. Only those human bones that appeared to have anomalous traits were removed, and most of these have lost their provenience.

Christensen excavated 54 burial features, including a total of 63 individuals (Figure 4.7, Tables 4.5 and 4.6). Christensen made the age and sex determinations in the field, and since the majority of the bones were not collected, it was not possible to check the accuracy of his estimates. This problem is discussed further by Wilkinson in Chapter 8. The artifact descriptions in Table 4.6 are from Christensen's field notes. Some items are discussed in greater detail by Sullivan and Coffin in Chapter 9.

Christensen also identified 12 refuse and 2 fire pits. The pit features are described in Tables 4.7 and 4.8. The bias toward burial excavation meant that other types of information were ignored. Provenience information for the materials from the refuse and fire pits is not as thorough as that from the burials. Thus, as with the Harrington collections, it was not possible to construct a comprehensive listing of the artifacts associated with the pit features. The descriptions in Table 4.8 are from Christensen's field notes. An additional problem is that not all of the refuse or fire pits were mapped. Eleven features mentioned in the field notes are not on Christensen's site map; 9 of these were either refuse or fire pits. Post molds are mentioned only once in conjunction with Pit 24: "there were several post molds directly over this grave." It also appears that Christensen encountered the remnants of what Parker called the village area or earth ring. He mentioned a possible midden deposit at the northwest corner of the field, about 2 ft in depth.

THE CONKLIN EXCAVATIONS

Carlton Conklin, William Wheelock, John Weber, and Gordon Schmahl worked at the Ripley Site during the summer of 1962, and apparently continued sporadic excavations from 1963 through 1965. Their investigations were mainly confined to the eastern portion of the knoll, although it is difficult to exactly place their excavations. The locations of individual excavation units appear to have been based on test probes. The report of the 1962 excavations by Conklin mentions the use of probes and includes a drawing of a probe of the type often used by amateurs to find burials in a diagram of one of the excavated burials. This sketch (Figure 4.8) also shows a "grave fire" over the grave.

In 1962, a numbering system was used to distinguish various kinds of features. Numbers 1 through 45 were used for "ash pits;" X1 to X11 were "storage pits;" the letters A through Z were used for burials;

Table 4.5. Burials Excavated by Christensen.

Pit No.	Dimensions			Position	Sex	Age	Orientation	Comments
	Width	Length	Depth					
*	n.d.	n.d.	18 in	flexed	n.d.	n.d.	north	2 individuals
1*	n.d.	n.d.	48 in	n.d.	n.d.	adult	n.d.	badly decayed
6	72 in	72 in	48 in	flexed	M	adult	n.d.	3 individuals in a circular pit
					M	adult	n.d.	
					F	old	n.d.	
8	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	
11	n.d.	n.d.	n.d.	flexed	n.d.	n.d.	south	layer of black substance covering the legs
12	n.d.	n.d.	60 in	flexed	n.d.	n.d.	south	
15	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	southeast	2 individuals with backs to each other
16	n.d.	n.d.	n.d.	flexed	n.d.	n.d.	south	badly decayed
17	n.d.	n.d.	9 in	flexed	n.d.	child, 7 yrs.	east	
18	n.d.	n.d.	12 in	flexed left side	F	adult	southeast	
19	n.d.	n.d.	52 in	n.d., right side	F	adult	west	
21	n.d.	n.d.	30 in	flexed left side	n.d.	n.d.	east	
22	n.d.	n.d.	14 in	n.d.	n.d.	infant	n.d.	
23	n.d.	n.d.	9 in	n.d.	n.d.	infant	n.d.	disturbed by plowing
24	n.d.	n.d.	36 in	flexed right side	F	young adult	n.d.	
25	n.d.	n.d.	n.d.	flexed left side	F	young adult	south	
26	n.d.	n.d.	30 in	right side	n.d.	child	north	
27	n.d.	n.d.	56 in	flexed	n.d.	adult	southwest	3 individuals
28	n.d.	n.d.	n.d.	flexed right side	n.d.	n.d.	southeast	
29	n.d.	n.d.	n.d.	flexed right side	n.d.	n.d.	east	
30	n.d.	n.d.	n.d.	flexed left side	n.d.	n.d.	east	copper band preserved skin and robe covering
31	n.d.	n.d.	24 in	flexed left side	n.d.	n.d.	south	
32	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	almost complete disintegration
33	n.d.	n.d.	44 in	flexed left side	n.d.	n.d.	southwest	
34	n.d.	n.d.	n.d.	flexed left side	n.d.	n.d.	southwest	
35	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.		totally decomposed
36	n.d.	n.d.	28 in	flexed right side	n.d.	adult	east	
37	n.d.	n.d.	14 in	n.d.	n.d.	n.d.	southeast	badly disintegrated
38	n.d.	n.d.	30 in	n.d.	n.d.	n.d.	south	
39	n.d.	n.d.	48 in	flexed left side	n.d.	n.d.	southeast	
40	n.d.	n.d.	40 in	n.d.	n.d.	n.d.	n.d.	badly decayed
41	n.d.	n.d.	38 in	n.d.	n.d.	n.d.	n.d.	no skeletal material left
42	n.d.	n.d.	38 in	n.d.	n.d.	n.d.	n.d.	no skeletal material left
43	n.d.	n.d.	n.d.	flexed left side	n.d.	n.d.	east	badly decayed
44	55 in	66 in	58 in	flexed right side	n.d.	n.d.	east	large diameter shaft, appears to have had four wooden planks covering the skeleton
45	n.d.	n.d.	n.d.	flexed	n.d.	n.d.	northwest	badly decayed
46	n.d.	n.d.	30 in	n.d.	n.d.	n.d.	n.d.	no skeletal material left

47	60 in	60 in	30 in	bundle	n.d.	adult		disarticulated adult long bones piled together
				bundle	n.d.	adult		disarticulated adult long bones piled together
				n.d.	n.d.	infant	n.d.	
				n.d.	n.d.	infant	n.d.	
48	42 in	7.5 ft	40 in	flexed	n.d.	n.d.	northeast	length of skeleton 5 ft 8 in; teeth well worn
49	n.d.	n.d.	30 in	flexed	n.d.	n.d.	northeast	2 individuals facing each other
					n.d.	n.d.		
50	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	"small grave," few skeletal remains
51	n.d.	n.d.	n.d.	n.d.	n.d.	adult	east	2 individuals; refuse pit
					n.d.	adult	east	intrudes into one corner
53	n.d.	n.d.	50 in	flexed right side	n.d.	n.d.	northwest	charred grass lining bottom of feature
54	n.d.	n.d.	48 in	flexed right side	n.d.	n.d.	southeast	
55	n.d.	n.d.	28 in	flexed left side	n.d.	n.d.	east	
56	n.d.	n.d.	28 in	flexed left side	n.d.	n.d.	n.d.	
57	n.d.	n.d.	n.d.	flexed left side	n.d.	juvenile, 18 yrs.	south	
58	n.d.	n.d.	n.d.	flexed right side	M	adult	?	
59	36 in	60 in	54 in	flexed right side	n.d.	n.d.	east	
60	36 in	60 in	50 in	flexed left side	M	adult	east	
61	36 in	55 in	54 in	flexed left side	F	elderly	east	
62	36 in	76 in	40 in	extended	n.d.	n.d.	south	small stature spine shows deformity
63	n.d.	n.d.	n.d.	flexed	n.d.	n.d.	southeast	red ochre stain on entire bottom of pit
64	36 in	48 in	36 in	flexed right side	?	?	northwest	red ochre at head and hips

n.d.: no data available
* Indicates those pit features left off Christensen's site map.

TABLE 4.6. ARTIFACTS ASSOCIATED WITH BURIALS EXCAVATED BY CHRISTENSEN.

	Material Category						
Pit No.	Chipped Stone	Ground Stone	Pottery	Bone/Shell Artifacts	Bone/Shell Refuse	Pipes	Other
*	—	—	—	—	—	—	—
1*	—	—	—	—	—	—	—
6	—	—	pot	—	—	—	—
8	projectile point, biface	—	pot, sherds	antler fragment	—	—	—
11	2 projectile points, chert pebble	—	pot	"eagle" skull, turtleshell rattle, jaw bones of carnivore	—	—	iron "dagger"
12	scraper	—	pot	antler flaker, beaver mandible	—	—	red ochre
15	—	—	pot	—	—	—	—
16	—	—	pot with double castellations	—	—	—	—
17	—	—	pot	—	—	—	—
18	biface	rectangular slate stone	—	—	—	—	—
19	—	—	pot	—	fish bones inside pot	—	—
21	biface, 4 projectile points, debitage	paddle-shaped stone	pot	wolf jaw	—	—	2 iron bars, iron knife
22	—	—	—	—	—	—	—
23	—	—	—	—	—	—	—
25	—	—	pot	—	—	—	—
26	—	—	pot	beaver tooth	—	—	—
27	3 projectile points, 4 bifaces	—	3 pots	3 beaver teeth, 11 button-like antler objects, 3 bone awls, bird beak, claw, 2 bird wing bones	—	—	ochre, 2 iron chisels, 2 marine-shell fossils
28	—	—	pot	—	—	—	—
29	—	—	3 pots	—	—	—	—
30	—	—	pot	—	—	—	copper arm band
31	—	—	pot	—	—	—	—
32	—	—	—	—	—	—	copper arm band
33	debitage, 4 projectile points, 2 scrapers, ovate biface, drill	—	pot	bear tusk, 2 bear jaws, bone awl, beaver tooth, 2-prong bone comb, large bird wing	shell fragments.	—	iron bar, sheet copper, several pieces of copper encased in skin
34	—	—	pot	—	—	—	—

35	———	———	pot	———	———	———	———
36	9 projectile points, 2 chert pieces, 4 bifaces	———	2 pots	———	———	trumpet pipe	red ochre over projectile points
37	———	———	pot	———	———	———	———
38	———	celt	pot	———	———	———	———
39	———	celt	pot	———	———	———	———
40	———	———	2 pots	———	———	———	———
41	———	———	pot	———	———	———	———
42	———	———	pot	———	———	———	———
43	———	———	pot	———	———	———	———
44	———	———	pot	———	———	———	———
45	———	———	———	———	———	———	———
46	———	paddle-shaped stone	pot	———	———	———	2 chunks of iron
47	ovate biface, 4 projectile points	———	———	2 bear canines,. elk tooth	———	———	———
48	———	———	———	———	———	———	———
49	2 projectile points	flat stones	2 pots	———	———	———	iron chisel
50	———	———	———	———	———	———	red ochre
51	———	———	pot	———	———	———	2 copper bracelets
53	———	———	2 pots	———	———	———	———
54	———	———	pot	———	———	———	———
55	projectile point, ovate biface	———	pot	———	———	———	red ochre
56	———	———	pot	———	———	———	———
57	———	———	pot	———	———	———	———
58	———	polished stone	———	beaver incisor, antler tool	———	———	———
59	———	———	pot	———	———	———	———
60	———	———	———	———	———	———	———
61	———	———	———	———	———	———	———
62	———	———	———	———	———	———	———
63	———	———	pot	———	———	———	red ochre

* Indicates those pit features left off Christensen's site map.

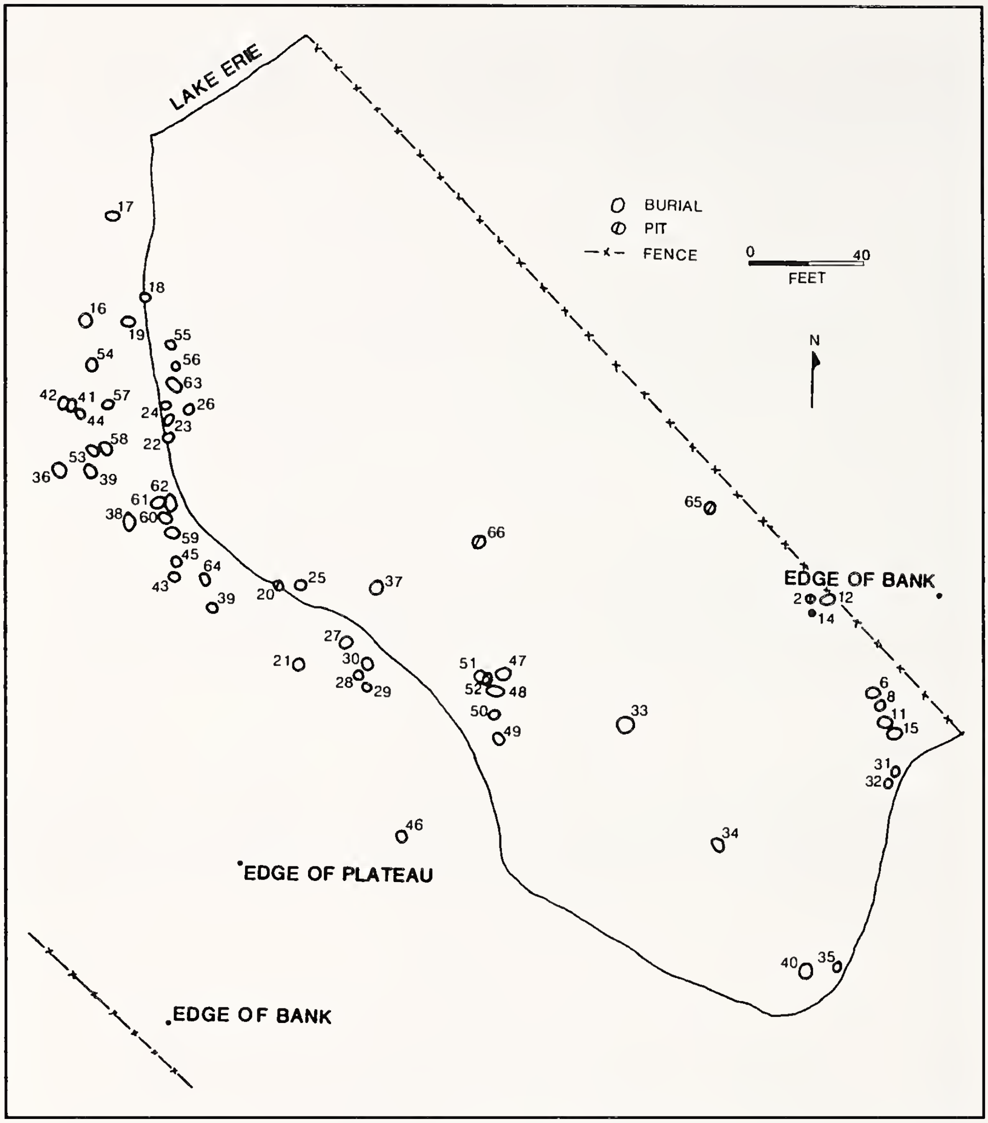

Figure 4.7 Map of J. Christensen's excavations. Redrawn from a copy of the original on file at the New York State Museum.

TABLE 4.7. DIMENSIONS OF PIT FEATURES EXCAVATED BY CHRISTENSEN.

Trench-Pit Number	Type	Dimensions Width	Length	Depth	Comments
*	refuse	n.d.	n.d.	n.d.	
2	refuse	5 ft	5 ft	24 in	circular
3*	fire	n.d.	n.d.	n.d.	
4*	refuse	n.d.	n.d.	n.d.	small
5*	fire	n.d.	n.d.	n.d.	
7*	refuse	n.d.	n.d.	n.d.	
9*	refuse	48 in	48 in	30 in	within village
10*	refuse	n.d.	n.d.	n.d.	shallow
13*	refuse	n.d.	n.d.	n.d.	
14	refuse	n.d.	n.d.	n.d.	
20	refuse	n.d.	n.d.	n.d.	
52	refuse	n.d.	n.d.	n.d.	intrudes into Feature 51
65	refuse	n.d.	n.d.	n.d.	
66	refuse	n.d.	n.d.	n.d.	

n.d.: no data available
* Indicates those pit features left off Christensen's site map.

TABLE 4.8. CONTENTS OF PIT FEATURES EXCAVATED BY CHRISTENSEN.

	Material Category						
Pit No.	Chipped Stone	Ground Stone	Pottery	Bone/Shell Artifacts	Bone/Shell Refuse	Pipes	Other
*	debitage	—	sherds	—	"quantity of broken bones"	—	—
2	4 projectile points, 4 projectile point fragments, drill, shale projectile point	hammerstone, 3 stone balls	sherds	3 bone beads	animal bones	bowl fragment	ashes
3*	2 projectile points	—	pot	—	—	—	—
4*	drill	—	sherds	—	—	—	—
5*	—	hammerstone	pot	—	—	—	—
7*	3 projectile points	—	—	—	—	—	—
9*	projectile point	pestle	sherds	bone bead, bone awl	—	—	—
10*	—	—	—	bone bead	—	—	—
13*	2 projectile points	—	—	—	—	—	—
14*	—	—	sherds	bone awl, 3 shell beads	—	—	—
20	2 projectile points	—	sherds	bone awl, 2 bone beads, antler tine, perforated bear tooth	—	—	—
52	—	—	sherds	—	—	bowl fragment	—
65	—	—	—	—	—	—	—
66	—	—	—	bear skull	—	—	—

* Indicates those pit features left off Christensen's site map.

and A1 to E5 referred to "ceremonial pits." The latter are described as pits that

> always appeared near the burials and never had any refuse in them. The ash was always of a red color and never exceeded more than three or four inches in the subsoil, and ... always showed signs of a hot fire being in them [Conklin 1962].

Figure 4.9 is Conklin's map showing the locations of the features excavated in 1962. Conklin noted that the trenches shown located off the eastern side of the knoll were dug by William Wheelock. The collections from these trenches are curated at the Marian E. White Museum at the State University of New York at Buffalo. The pottery was examined by William Engelbrecht and is discussed in Chapter 5.

Conklin (1962) provided a brief discussion of his interpretations of depositional processes at the site. He described the upper layer of soil as a yellow sand, ranging from 10 to 14 in deep in most places and noted that most features originated under this sand. Conklin suggested that the upper level of sand deposits was blown over an older occupational level. Under the sand was a clay layer, which was exposed at the southwest end of the knoll. In the northeast area of the knoll, the occupational layer was 18 to 20 in deep, with "no sign of refuse or post molds where these people could have lived here" (Conklin 1962). A midden area was noted on the southeastern side of the knoll. The black soil in this area was 19 to 20 in deep. No sherds or bones were found in the black soil, but "to the bottom of it [was] found the usual refuse, which again showed the sand had been put over it" (Conklin 1962).

On the crest of the knoll in some areas, the village deposits were only 2 to 3 in deep, while in other areas these deposits ranged from 10 to 15 in deep and had "refuse from the top to the bottom" (Conklin 1962). Conklin also noted a "high round knoll" to the southwest of the refuse that "lays on the side bank." Time did not permit investigation of this knoll in 1962, and there is no information about investigations of this feature in subsequent years.

Most of Conklin's report provides descriptions of the 23 burials excavated in 1962 (Tables 4.9 and 4.10). Wilkinson discusses the extant skeletal material from the Conklin excavation in Chapter 8. Because these materials have been disassociated from their proveniences, it was not possible to directly check Conklin's age and sex estimates. The artifacts have generally suffered the same fate. The Rock Foundation acquired portions of Conklin's and Weber's collections from the Ripley Site, after these materials had passed through other hands. They are now housed at the Rochester Museum & Science Center. A very few items can be associated with specific burials (Burials D, I, and S) from the 1962 excavations. Thus, Conklin's descriptions are the only available information describing funerary objects associated with specific burials.

Fifty-two pit features, exclusive of the burial pits, were also excavated that summer, but Conklin's report does not provide descriptions of these features. Other than his map of feature locations, the only information about the pit features is a listing of all artifacts found in pits. This list is not correlated to individual pits. A similar list is provided of artifacts from the "refuse bank." Items of particular note on these lists are the trade items including a "coiled

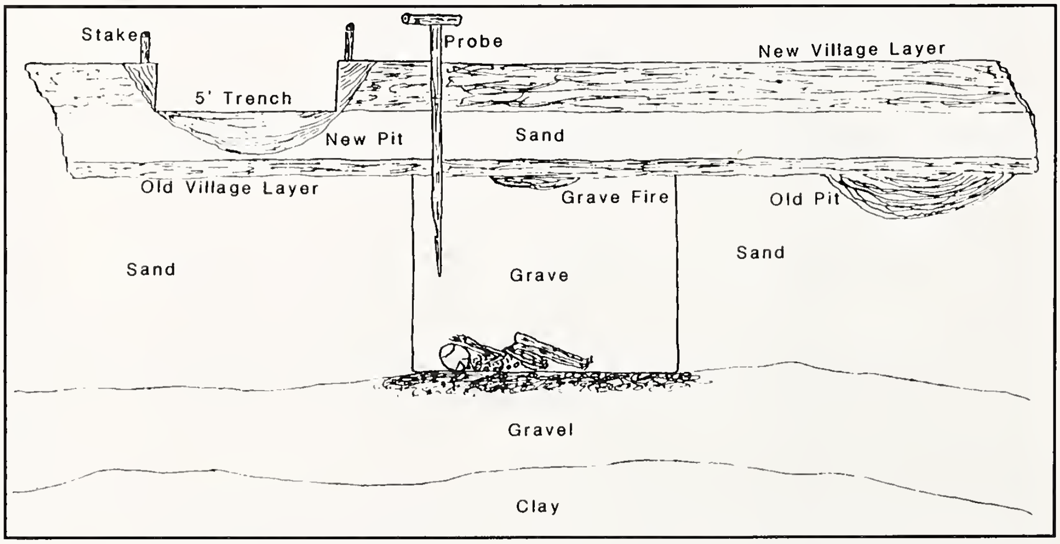

Figure 4.8 Sketch of a burial excavated by Conklin. Note the "grave fire" above the grave. Redrawn from a copy on file at the New York State Museum.

TABLE 4.9. BURIALS EXCAVATED BY CONKLIN.

Pit No.	Dimensions			Position	Sex	Age	Orientation	Comments
	Width	Length	Depth					
A	14 in	18 in	18 in	semi-flexed, left side	n.d.	child	east	
B	16 in	20 in	39 in	flexed, left side	n.d.	child	southeast	intruded by Grave A
C	4 ft	12 ft	37 in	flexed, right side	F?	young adult	west	
D	6 ft	12 ft	37 in	flexed, left side	F?	young adult	east	
E	24 in	40 in	30 in	semi-flexed, left side	n.d.	child	southeast	
F	27 in	38 in	38 in	flexed, left side	n.d.	child	southeast	
G	33 in	42 in	57 in	flexed, right side	n.d.	adult	southeast	
H	34 in	40 in	59 in	flexed, right side	F?	adult	southeast	
I	49 in	54 in	64 in	flexed, left side	F?	adult	southeast	2 individuals plus possible infant with female
				flexed, right side	M?	adult	southeast	
J	35 in	49 in	58 in	flexed, right side	M?	adult	southeast	
K	32 in	40 in	46 in	n.d.	n.d.	n.d.	n.d.	"empty grave"
L	30 in	48 in	43 in	flexed, right side	n.d.	adult?	northeast	
M	33 in	48 in	23.5 in	flexed, left side	n.d.	adult?	east	
N	30 in	40 in	30 in	flexed, left side	n.d.	adult?	east	
O	37 in	47 in	38 in	flexed, right side	n.d.	adult?	southeast	
P	31 in	42 in	31 in	flexed, left side	n.d.	adult?	east	
Q	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	"previously excavated"
R	36 in	46 in	32 in	flexed, left side	n.d.	child	northeast	
S	12 in	26 in	26 in	flexed, right side	n.d.	child	southwest	
T	14 in	28 in	28 in	flexed, left side	n.d.	child	southwest	
U	25 in	43 in	6 ft 3 in	flexed, left side	F**	adult	west	"trepanned skull"
V	20 in	24 in	36 in	flexed, right side	n.d.	child	east	
W				not assigned				
X	11 in	18 in	20 in	n.a.	n.a.	n.a.	n.a.	"woodchuck grave"

n.d.: no data available
n.a.: not applicable
** Sex estimate by R. Wilkinson

TABLE 4.10. ARTIFACTS ASSOCIATED WITH BURIALS EXCAVATED BY CONKLIN.

Pit No.	Material Category						
	Chipped Stone	Ground Stone	Pottery	Bone/Shell Artifacts	Bone/Shell Refuse	Pipes	Other
A	—	—	2 pots	—	—	—	—
B	—	—	pot	—	—	—	—
C	—	—	pot	—	—	—	—
D	—	celt	pot	bone bead	—	—	—
E	—	pot	—	shell gorget	—	—	—
F	—	—	—	shell spoon, shell beads	—	—	beads form necklace and 2 bracelets
G	scraper	—	pot	4 shell beads, deer jaw	—	pipe	woodchuck skeleton possibly associated
H	—	—	pot rim sherd	—	—	—	piece of iron, ochre
I	—	—	2 pots	—	—	—	red ochre, pottery clay
J	knife	2 celts	pot	bone bead, antler flaker	bird bone, fish bones	pipe	quartz, corn
K	—	—	—	—	—	—	—
L	scraper, "cache blade," 9 projectile points, "unworked flint"	2 celts "unfinished celt"	pot	bone bead, bone hair pin	—	—	—
M	—	smoothing stone	—	—	—	—	—
N	—	—	—	—	—	—	—
O	scraper	—	—	—	—	—	—
P	scraper	—	—	—	—	—	—
Q	—	—	—	—	—	—	—
R	—	—	pot	—	—	—	—
S	—	—	pot	shell beads	—	—	—
T	—	—	pot	shell beads	—	—	—
U	—	—	pot	—	—	—	2 unidentified "lime-covered" objects
V		pestle	—	—	—	—	—

copper ear ring," several tubular copper beads, a "knife blade," and a "block of iron."

The only record of the post-1962 excavations are two maps, one dated 1963, on file at the Rochester Museum & Science Center. One map shows locations of burials and the other a plan of a structure excavation. Careful comparison of the burial location map with the 1962 map suggests that the former is a composite showing the locations of burials excavated in 1962 and those presumably excavated in subsequent years. Figure 4.10 is a portion of the map showing the locations of the burials and what appear to be a few pit features excavated after 1962. This map indicates that an additional 43 burials were excavated. Figure 4.11 shows the structure pattern excavated in 1963. Although the excavation techniques invite caution in interpretation, the structure appears to be similar in form and proportions to those recorded by Harrington. Problems with map scales, datum points, and measurements prohibit accurate location of Conklin's excavations in relation to present features at the site.

The bulk of the Conklin and Weber collections at the Rochester Museum appear to be from post-1962 excavations. Information for some items includes dates of excavation from March to December of 1963, June through October of 1964, and April and July of 1965. Some items are noted as having originated from individual graves and some from "the refuse midden," but most objects have no provenience information. Of interest in this material are several trade items of European origin. Among them are translucent blue and green glass beads; several iron objects, including knife blades, chisels, spikes, and a pail fragment; several brass tubular beads and sheet brass finger rings; a triangular brass projectile point; and a hinged brass lid. Several botanical specimens, including berry seeds, and charred corn cobs, wood, and nuts, are also present in this material. That more items of European origin occur in these collections than in any of the other collections raises the possibility that Conklin et al. may have found an area of the site that was used later than other areas. Without adequate provenience information, it is not possible to determine with any certainty whether this was the case.

OVERVIEW OF THE EXISTING INFORMATION

The investigations at the Ripley Site by a variety of individuals of various training and intent has yielded considerable information of varying quality and integrity, most of which is unpublished and nominally analyzed. A large percentage of the site has been excavated. Figure 4.12 is a schematic composite of all known excavations.

Despite all this work, the plan of the site is not well understood. The types of structures that may have been present and their arrangement is not clear. Parker's division of the site into "village" and "burial ground" areas also appears rather arbitrary, since all known excavations have found burials in all areas of the site. The only possible exception is the north-central portion in the vicinity of the earth ring. Few burials appear to have been located in this area, but due to the imprecise nature of the maps of excavation locations, it is not possible to be confident about this pattern.

Another deficiency in the recording techniques is the information on pit features. Parker and Harrington drew a few profiles of pit features (cf. Parker 1907:Figure 7) but did not consistently record this information. None of the other investigators drew profiles.

Screening of the excavated deposits was not routinely done by any of the investigators. It can thus be inferred that all of the collections are biased toward larger objects. Since flotation techniques were not employed at the time of any of these investigations, the collected botanical remains are undoubtedly not representative of the full range of materials that exist in deposits at the site.

There is an abundance of other types of information available from the existing materials. The emphasis of most investigators on burial excavation has produced a relatively large database for examining the biological characteristics of the resident population, information about mortuary practices, and a wide array of funerary objects. Many of these latter artifacts are complete specimens of the kinds of objects used at the site. For example, a large number of whole pottery vessels is available for study.

The various investigators also paid attention to or retrieved types of information or material not collected by others. For example, Parker was the only investigator who collected a large amount of nonartifactual faunal materials. Only Conklin et al. and Guthe recorded post-mold patterns with any degree of precision.

The information concerning land use recorded by the various investigators will prove useful for future investigations of the site. During each excavation since Parker's, the conditions and use of the site have differed. By the time of Parker's 1907 report, the orchard covering the site had been removed (Parker 1907:476). When Guthe was excavating in 1952, the site was divided into two pastures with a fence running generally north to south through the

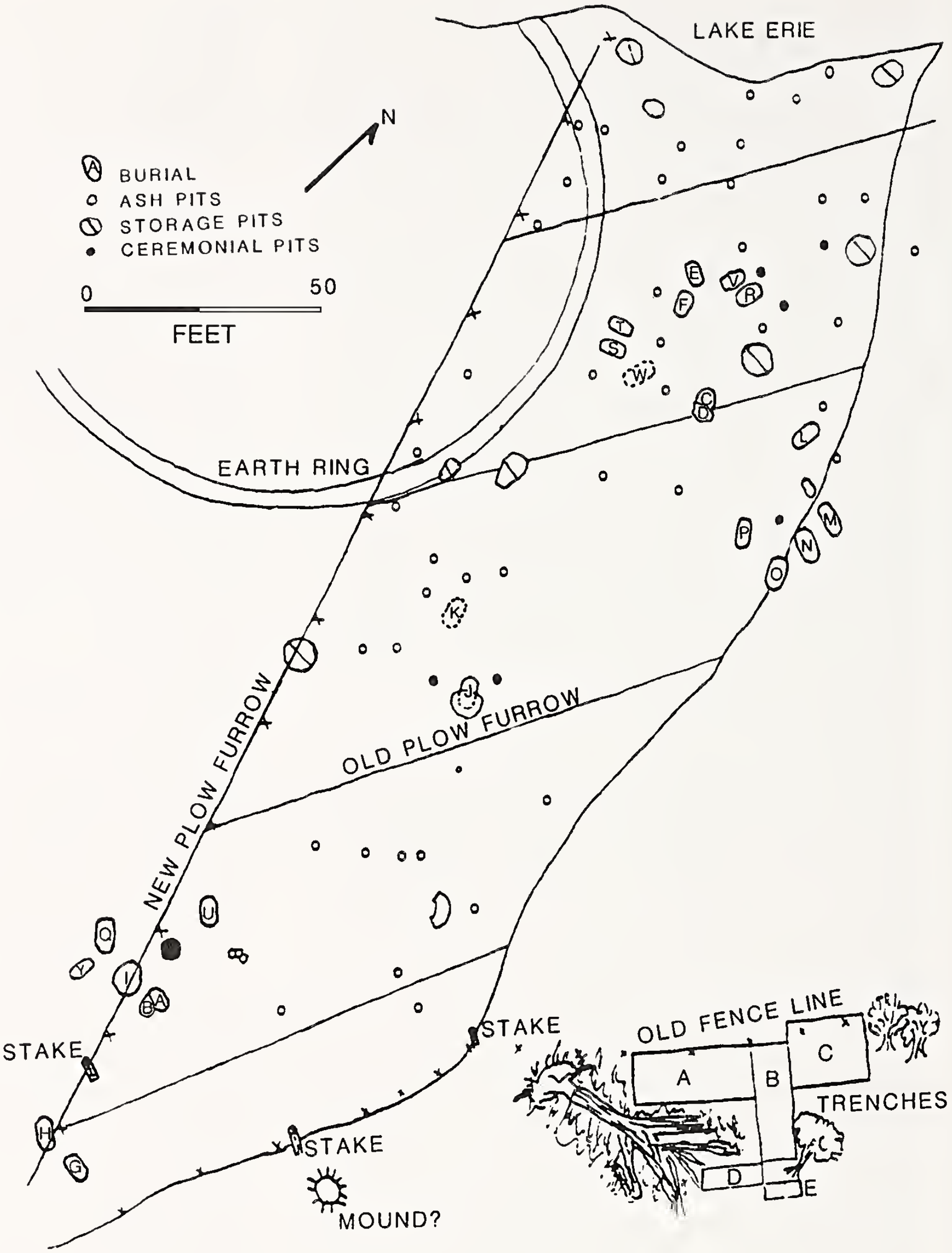

Figure 4.9 Map of Conklin's 1962 excavations. Redrawn from a copy on file at the Rochester Museum & Science Center.

middle. The date for the first use of the site as pasture is unknown.

Christensen reported that by 1957, the western half of the site had been left fallow and had gone to scrub, while the eastern half remained in pasture. During this period, surface collecting must have been at a minimum, with artifacts only being collected from the eroding bluff face. Christensen's clearing of the western portion of the site in the late 1950s allowed the entire knoll to be used as pasture for an unknown number of years. More recently, the site has been regularly used as either corn or hay fields.

Although the existing information from the Ripley Site is flawed by modern archaeological standards, the fact that large portions of these collections have remained intact and are available for study is quite remarkable. The collections and records from the early twentieth century also provide an appreciation of the impact that refinements in recovery techniques have made on the discipline, both on the kinds of information that are now expected from excavations and the questions that are now asked. On the other hand, unless efforts to educate the public about archaeology can deter untrained individuals from investigating and excavating irreplaceable archaeological sites, the job of interviewing collectors and working with less than ideal documentation will continue as an important component of archaeological research.

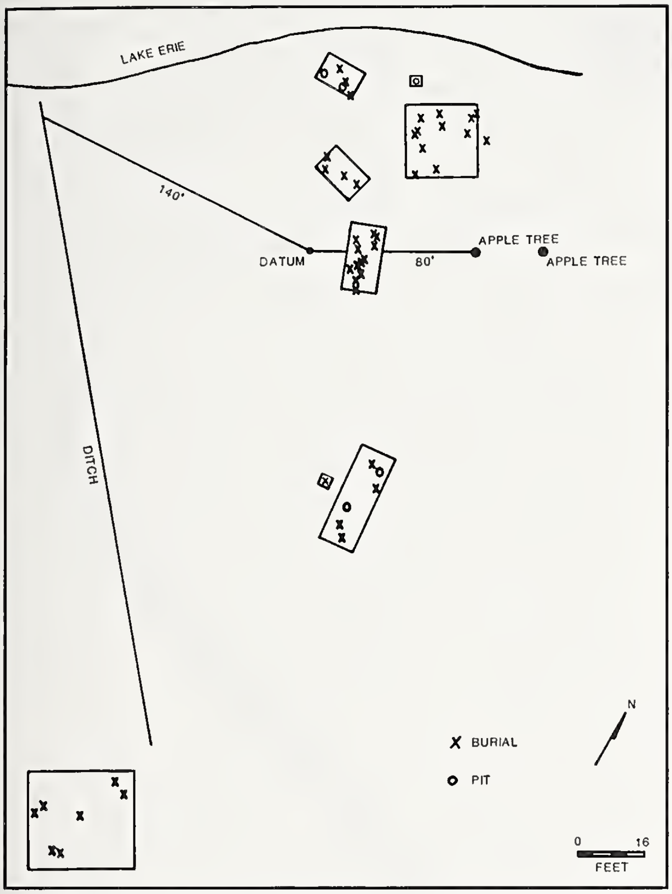

Figure 4.10 Map of Conklin's post-1962 burial excavations. Redrawn and simplified from a copy on file at the Rochester Museum & Science Center.

Acknowledgments. Numerous individuals and organizations assisted in providing access to the information contained in this chapter. Members of the Chautauqua Archaeology Society provided leads and access to private collections. Mr. Jordan Christensen provided access to his notes and photographs and allowed project staff to photograph his collection. Before his death in 1988, Carleton Conklin gave the photographs of Parker's field camp (Figures 4.2 and 4.3) to the Ripley Archaeological Project and shared his memory about work at the Ripley Site. Ian Brown, then of the Harvard Peabody Museum, supplied copies of Harrington's catalogue and arranged for copies to be made of Harrington's field photos. Vince Martonis, Hanover Town Historian (Chautauqua County, New York) discovered Harrington's original field map in the Peabody archives when conducting some research into Chautauqua County history. Vince also supplied the project with the chapter from Burmaster's autobiography that describes his experiences as Parker's field hand at the Ripley Site. Lisa Anderson, Anthropology Collections Manager at the New York State Museum, made the connection between Burmaster's Ripley excavations and the unlabeled burial sketch and description. The Rochester Museum & Science Center provided access to Alfred Guthe's collections and notes, maps of Conklin's excavations, and information about the Conklin and Weber collections. Virginia Barnes provided a map of Guthe's excavations that had been

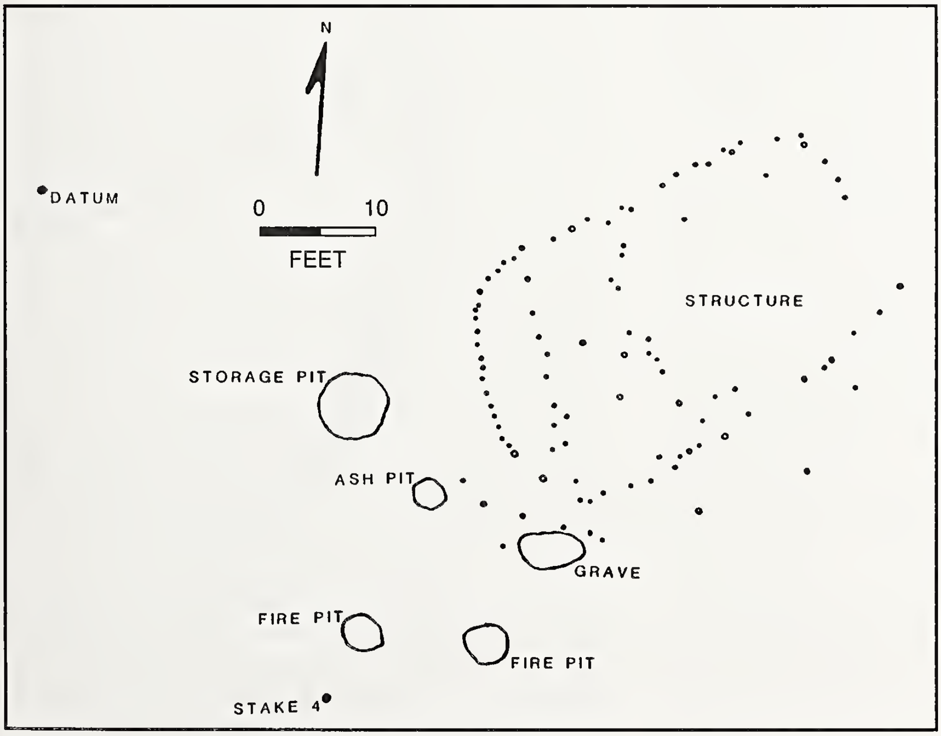

Figure 4.11 Plan of structure excavated by Conklin. Redrawn from a copy on file at the Rochester Museum & Science Center.

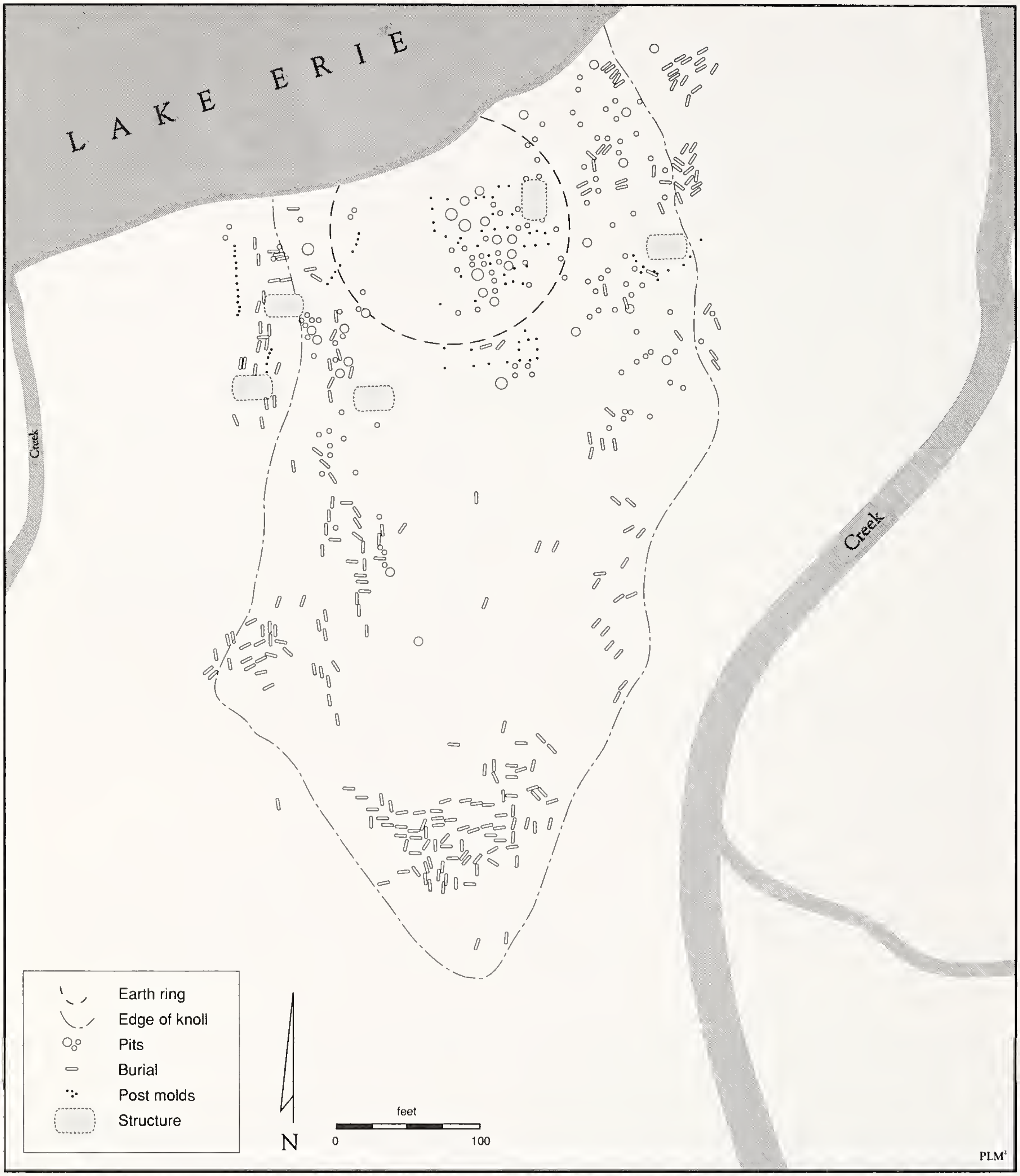

Figure 4.12 Schematic composite map of major excavations at the Ripley Site. Placement of features is based on a best guess of the relative locations of major excavations.

given to her uncle, who owned the Ripley Site at the time of these excavations. Melissa Churchill, intern at the New York State Museum, recognized that the Conklin burial location map was a composite of the 1962 and later excavations. We extend our apologies to anyone whose contribution we have overlooked, and we extend our sincerest thanks to everyone who helped us find the materials from the Ripley Site.

CHAPTER 5

CERAMICS

William Engelbrecht

This study of the ceramics from the Ripley Site is based on a sample of 562 vessels from three collections. The largest collection (367 vessels) is from the New York State Museum (NYSM) in Albany and was excavated for the Museum by Arthur C. Parker in 1906. I examined this material during the summer of 1987 when the bulk of the material was on loan to me and kept at the archaeological laboratory at Buffalo State College. Whole or nearly whole vessels were examined at the New York State Museum. The other major collection studied is housed in the Marian E. White Museum of Anthropology of the State University of New York at Buffalo (SUNY/Buffalo). It was originally made during the Conklin excavation (see Chapter 4) by William Wheelock, now deceased, of Dunkirk. This collection was studied in March and April of 1980, when the material was on loan to me at Buffalo State College. The final collection studied was received in 1972 from Frank Swartz of Erie, Pennsylvania, and is now curated at the New York State Museum.

The unit of study for this analysis was the vessel rather than individual sherds. All rim sherds in each collection were examined, and those sherds judged to be from the same vessel were temporarily placed together and were recorded as a single vessel. Vessels might therefore be represented by ten or more rim sherds, by a single rim sherd, or by a complete vessel. Since examinations of the NYSM and SUNY/Buffalo collections were separated by several years, the three collections were recorded separately and were not checked against one another to determine whether they contained sherds from the same vessel. Two additional criteria were used for including sherds in the analysis. If a vessel was only represented by a single rim sherd and that vessel was collared, a complete section of the collar had to be present for the vessel to be used in the analysis. If the vessel was uncollared, then the rim sherd had to be at least 2 cm by 2 cm to be included. Most rim sherds used in this analysis were at least 3 or 4 cm by 3 or 4 cm. In the NYSM collection, 519 rim sherds represented 367 vessels. These figures yield an average of about 1.4 sherds per vessel. The NYSM collection also includes 34 whole or nearly whole pots. In the SUNY/Buffalo collection, 209 rim sherds represented 188 vessels. For the Swartz collection, 7 rim sherds represented 7 vessels. When the SUNY/Buffalo collection and private collection are combined, there is an average of about 1.1 sherds per vessel. Unlike the NYSM collection, there were no whole pots in these two collections. In sum, 735 rim sherds representing 562 vessels, and 34 whole vessels were studied.

Body sherds were not considered in this analysis although they are present in abundance in the NYSM collection. The vast majority of both body sherds and rim sherds appeared to be grit tempered rather than shell tempered. Jack Schock (1974) studied the body sherds in the SUNY/Buffalo collection. His results are presented in Table 5.1. It should be noted that five body sherds had been separated from the other body sherds in the NYSM collection because they bore a black stripe or stripes. On two sherds this stripe was quite distinct. This is a characteristic that occurs occasionally on Iroquoian ceramics.

For the most part, the ceramic material studied lacks specific provenience within the Ripley Site. This is true of the Swartz collection and of 79 of the 188 vessels in the SUNY/Buffalo collection. The other pottery from Ripley in the SUNY/Buffalo collection (109 vessels) came from a midden on the east side of the site (see Chapter 4). The whole pots in the NYSM collection are assumed to have mainly come from graves. Thirteen incomplete vessels, represented by sherds, had specific provenience relating to a feature, either in the "village" or "cemetery," and 319 vessels had no specific provenience. It is assumed that the bulk of this unprovenienced material came from the general excavations in the "village" area. Due to the general lack of locational information on the Ripley ceramics, only a limited study of possible intrasite differences in ceramic distribution or style will be attempted here. Stylistic differences between the two major collections will also be discussed.

CERAMIC DESCRIPTION

A ceramic coding sheet was completed for each vessel. An example of this coding sheet and the attribute list used may be found in Appendix A. I have used the same attribute list and coding sheet for other studies of Iroquoian ceramics (Engelbrecht 1971, 1974, 1984). Information on the coding sheet was then transferred to optical scanning forms which were used as input to create a computer data file. To facilitate comparison with ceramic data from other sites, many of the original attributes were recoded into larger categories (see Appendix A). For example, estimates of vessel diameter were first recorded to the nearest cm. Then for purposes of comparison, vessel diameters were grouped into four size classes. Frequencies for many of these regrouped attribute classes are discussed below. Listings are given first for the combined SUNY/Buffalo and small private collection, next for the NYSM collection, and finally, for the entire sample.

CERAMIC TYPES. While the main focus of the ceramic description was on ceramic attributes, traditional ceramic types were also recorded. For the most part, these types were defined by MacNeish (1952), although Pratt (1960) suggested some modifications that are adopted here. Both the number and percentage of each type in the major collections are shown in Table 5.2, as are the number and percentage of each type in the total sample. The two most common types are Lawson Incised and Niagara Collared. In the SUNY/Buffalo sample, Niagara Collared is more common than Lawson Incised, while in the NYSM sample, Lawson Incised predominates. The third

TABLE 5.1. TEMPERING IN THE SUNY/BUFFALO CERAMIC COLLECTION.

Temper	Number of Sherds	% of Total
Grit temper	1,957	98.2
Shell temper	33	1.7
No temper	2	0.1

TABLE 5.2. SHERD TYPES.

	SUNY/Buffalo		NYSM		Total	
Type	n	%	n	%	n	%
Bainbridge Linear	0	0.0	2	0.5	0	0.4
Black-Pound Necked	0	0.0	2	0.5	2	0.4
Cayuga Horizontal	0	0.0	2	0.5	2	0.4
Dutch Hollow Notched	1	0.5	6	2.6	7	1.3
Garoga Incised	0	0.0	3	0.8	3	0.5
Genoa Frilled	1	0.5	6	1.6	7	1.3
Huron Incised	7	3.6	1	0.3	8	1.4
Iroquois Linear	1	0.5	0	0.0	1	0.2
Lanorie Mixed	0	0.0	1	0.3	1	0.2
Lawson Incised	57	29.2	142	38.7	199	35.4
Lawson Opposed	6	3.1	10	2.7	16	2.9
Long Pt. Horizontal	1	0.5	0	0.0	1	0.2
Long Pt./Seneca Notched	0	0.0	1	0.3	1	0.2
Niagara Collared	64	32.8	97	26.4	161	28.7
Ontario Horizontal	1	0.5	1	0.3	2	0.4
Ontario Oblique	2	1.0	1	0.3	3	0.5
Rice Diagonal	0	0.0	1	0.3	1	0.2
Richmond Incised	1	0.5	0	0.0	1	0.2
Ripley Collared	2	1.0	8	2.2	10	1.8
Ripley Corded	6	3.1	9	2.5	15	2.7
Ripley Plain	32	16.4	28	7.6	60	10.7
Ripley-Pound/Triangular	3	1.5	16	4.4	19	3.4
Seed Incised	1	0.5	5	1.4	6	1.1
Seneca Barbed Collar	0	0.0	5	1.4	5	0.9
Sidey Notched	0	0.0	2	0.5	2	0.4
Sparta Dentate	0	0.0	1	0.3	1	0.2
Warminster Crossed	1	0.0	0	0.0	1	0.2
Wagoner-Syracuse/Incised	0	0.0	1	0.3	1	0.2
Untyped	8	4.1	17	4.6	25	4.5

TABLE 5.3. VESSEL METRICS.

Volume (cc)	Height (cm)	Diameter (cm)
3000	17	17
480	9	8
600	13	10
1850	16	13
1700	17	12
2600	19	16
1400	14	12
2300	18	14
1500	16	13
1500	16	12
?	24	18
2100	15	13
1550	15	15
550	11	10
1900	17	14
575	11	10
1700	16	12
1100	14	11
?	18	13
2300	19	16
2600	18	15
800	13	11
1250	14	12
1025	11	14
750	12	10
1500	16	13
350	5	7.5
650	12	11
2100	19	14
1500	16	13
1050	14	11
1500	14	12
1500	14	14
400	9	7

most common type in both samples is Ripley Plain, which comprises approximately 11 percent of the total sample. A total of 28 types are represented, not counting the untyped vessels. The majority of these are present in very low frequencies.

VESSEL VOLUME. The whole vessels in the NYSM collection were measured for volume in addition to the information routinely collected for all vessels represented by rim sherds. Volume was determined by totally filling each vessel with styrofoam pellets and then pouring these into a calibrated container. Thus, the volume measurements represent a maximum capacity, since in everyday use these vessels were probably not totally filled. Two of the pots were in fragmentary condition, and their volumes could not be measured. The volume measurements of the remaining 32 pots, along with the heights and diameters of all 34 pots, are presented in Table 5.3.

A histogram of vessel volumes shows that the most common vessel capacity lies between 1400 and 1600 cc (Figure 5.1). The second most common vessel capacity is much smaller, lying between 400 and 600 cc. While there is a great range of vessel capacities represented in this sample, there is a tendency toward a bimodal distribution.

A plot of diameter against volume (Figure 5.2) suggests a close relationship between these two measurements. A linear equation of the form $y = 3.04x + 7.89$ best fits the points. The correlation coefficient (r) between diameter and volume is .90. Height was then plotted against volume where $y = 4.01x + 8.65$ (Figure 5.3). The correlation coefficient between height and volume is .88. Finally, height was plotted against diameter where $y = .6x + 3.5$ and $r = .86$ (Figure 5.4). If the relationship between volume, diameter, and height is considered, it is the first two variables that are most highly correlated among the whole pots from the Ripley Site.

VESSEL DIAMETER. The diameters of the whole vessels in the NYSM collection were measured directly. The diameters of the other vessels were estimated by matching sherd curvature against a series of concentric circles. With the exception of very small pots, only those sherds that exhibited at least 4 or 5 cm of rim were used to arrive at diameter estimates. These estimates are subject to error, since the mouths of some Iroquois pots are oval or square, rather than round, and may change markedly at a castellation. These figures should thus be regarded as best estimates (Table 5.4).

These percentages suggest that there are more small vessels in the NYSM collection and more medium vessels in the SUNY/Buffalo collection. Table 5.5 was prepared to illustrate this difference in greater detail. The first column lists diameters in cm, using the intervals present on the measuring chart. The second column lists the numbers and percentages of vessel diameters estimated for the SUNY/Buffalo collection and the small private collection. Diameter estimates were available for 60 vessels out of a total of 195. The third column lists diameter estimates for vessels in the NYSM collection. The whole vessels were removed from this sample. Diameter estimates were available for 62 vessels out of a total of 333. Finally, the last column lists diameter measurements for whole ceramic vessels in the NYSM collection. For this comparison, diameter measurements for the whole pots were lumped into the categories used for vessel diameter estimates. A listing of the actual diameters (to the nearest cm) may be found in Table 5.3. All 34 whole vessels were measured for diameter.

The above figures were used to generate the histograms shown in Figures 5.5, 5.6, and 5.7. Inspection of the histograms indicates that the diameters of

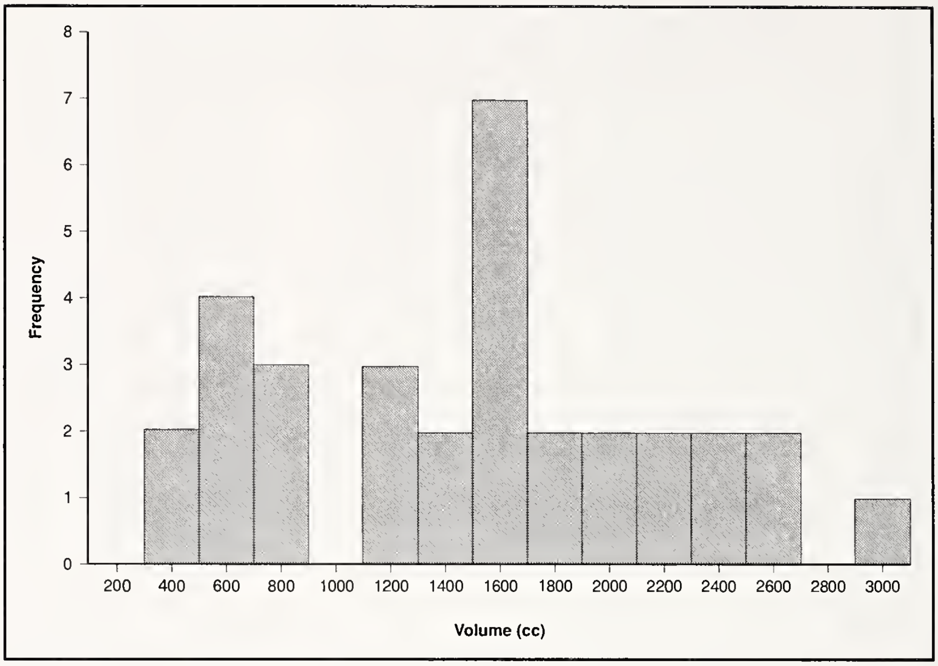

Figure 5.1 Histogram of whole vessel volumes.

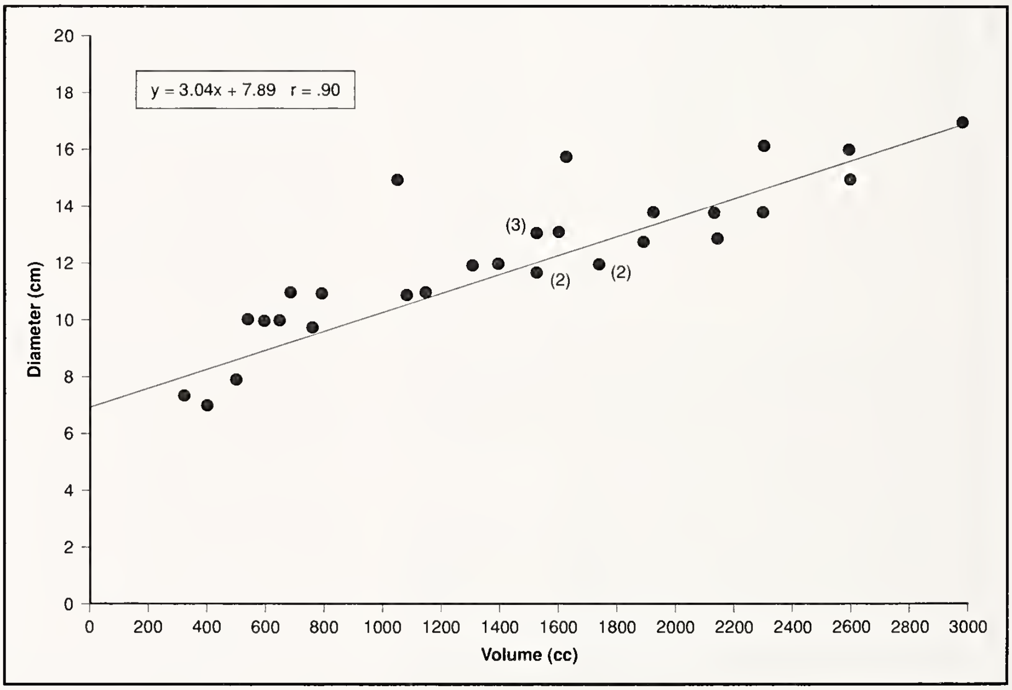

Figure 5.2 Plot of vessel diameter against vessel volume.

whole vessels tend to be smaller than the estimated vessel diameters in either the NYSM or SUNY/Buffalo collections. The differences in vessel diameters between the two major collections appears to reflect the presence of the smaller whole pots in the NYSM collection.

LIP SHAPE. Three basic lip shapes–flat, thickened, and rounded–were used in the analysis, although variations of these were distinguished during the initial coding. The SUNY/Buffalo collection contains more rounded lips, while the NYSM collection contains more flat lips (Table 5.6). It should perhaps be noted that there was an element of subjectivity in assigning some lips to either the flat or the rounded category. Also, a period of seven years separated the study of these two collections. Over this period, a subtle shift in the perception of the observer may have occurred. Despite these considerations, I would argue for some differences between the collections in lip shape.

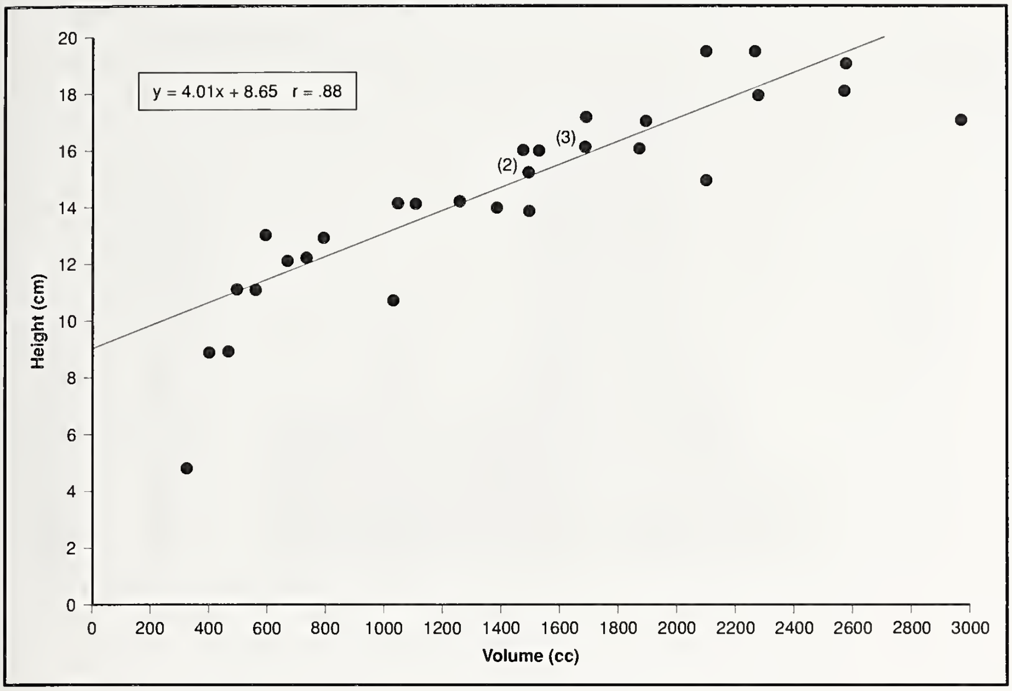

Figure 5.3 Plot of vessel height against vessel volume.

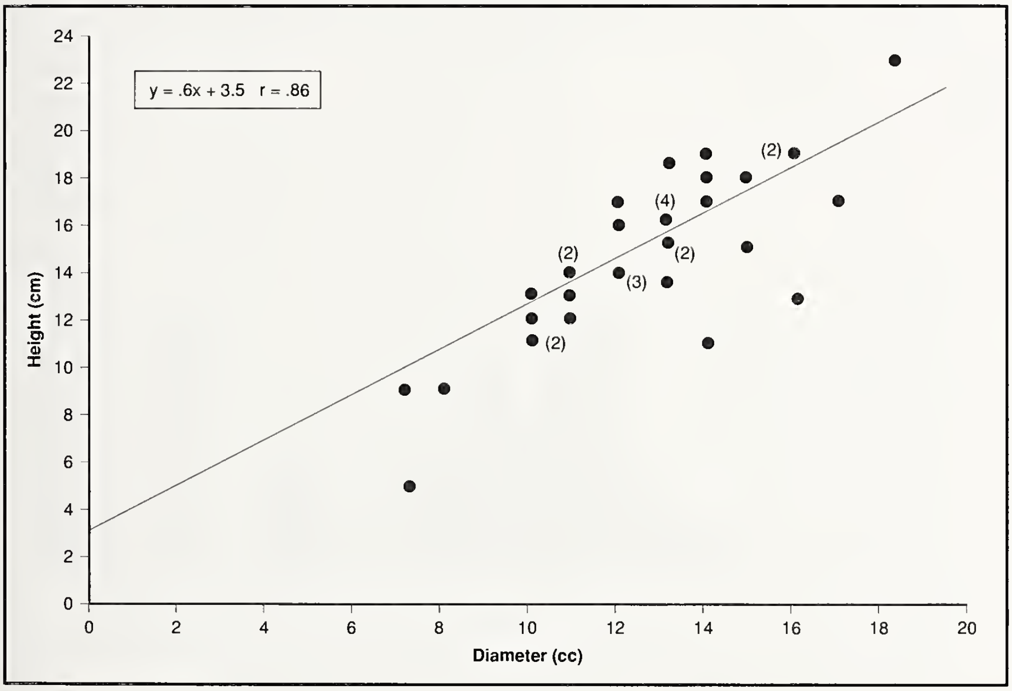

Figure 5.4 Plot of vessel height against vessel diameter.

LIP SURFACE. While there were many potential design treatments that could be recorded on the original coding sheet (Appendix A), the regrouped attribute list provided six categories. Four of these categories–plain, incised oblique, notched, and impressed or stamped–were present in the Ripley Site ceramics (Table 5.7).

RIM SHAPE. Both the interior and exterior of the rim were recorded as either concave, convex, or straight. Combining these two observations yielded nine possible rim shapes. The interior shape is listed first in Table 5.8.

INNER EDGE OF LIP. There were numerous potentially occurring treatments of the inner edge of the lip and the vessel interior just below the lip. For the most part, this area was left plain on the Ripley Site ceramics (Table 5.9). This is also generally the case in Late Woodland ceramics on the Niagara Frontier.

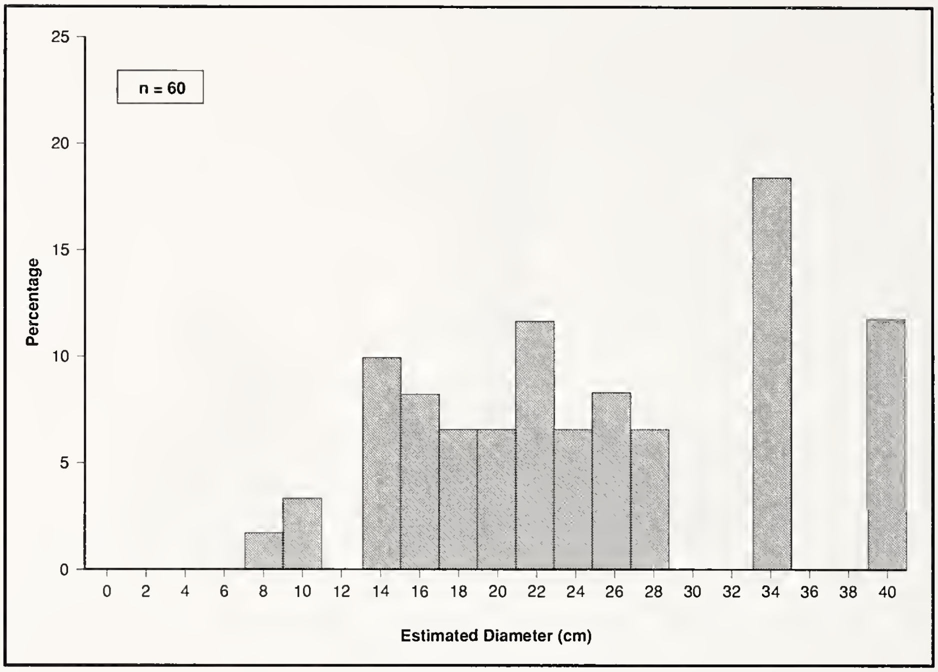

Figure 5.5 Histogram of vessel diameters estimated from sherds in the SUNY/ Buffalo collection.

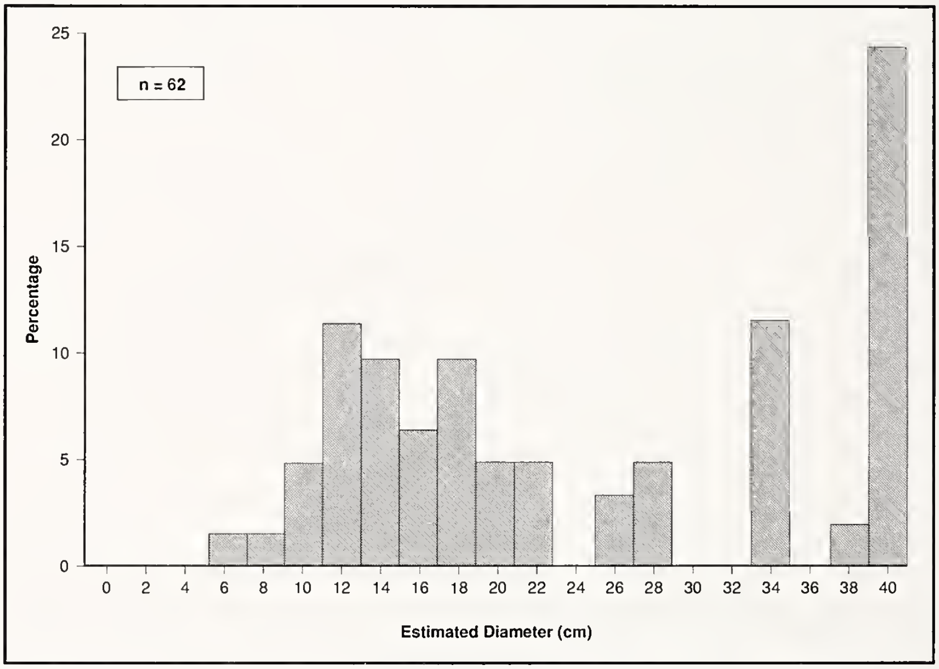

Figure 5.6 Histogram of vessel diameters estimated from sherds in the New York State Museum collection.

TABLE 5.4. VESSEL DIAMETERS.

	SUNY/Buffalo		NYSM		Total	
Diameter	n	%	n	%	n	%
Very small (≤ 6 cm)	0	0.0	2	2.3	2	1.4
Small (7-14 cm)	9	15.3	37	43.0	46	31.7
Medium (15-26 cm)	28	47.5	21	24.4	49	33.8
Large (≥ 27 cm)	22	37.3	26	30.2	48	33.1

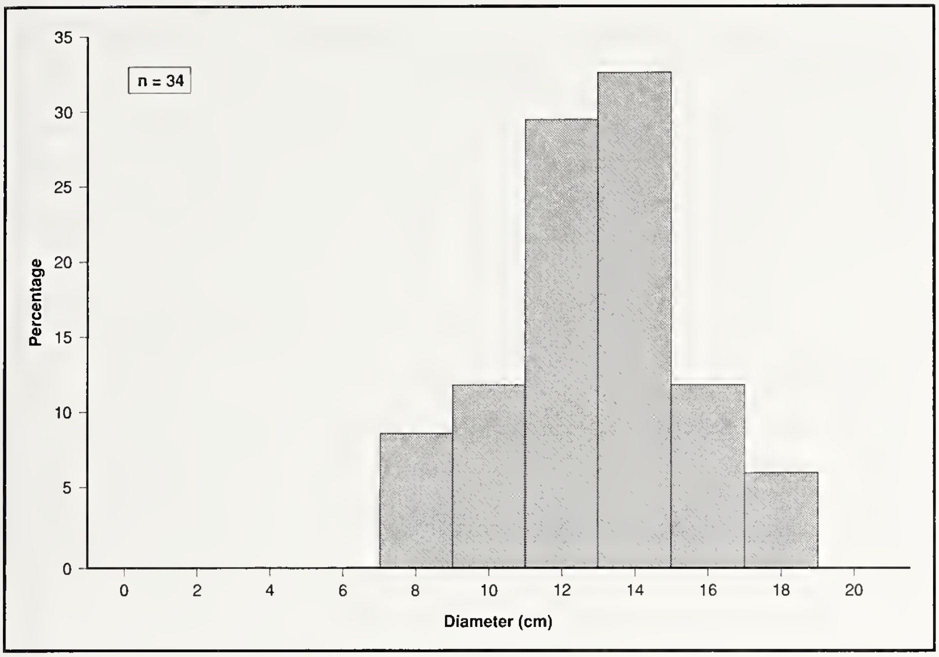

Figure 5.7 Histogram of whole vessel diameters.

TABLE 5.5. COMPARISON OF VESSEL DIAMETERS REPRESENTED BY SHERDS AND WHOLE VESSELS.

	SUNY/Buffalo		NYSM		Whole Vessels	
Diameter (cm)	n	%	n	%	n	%
6	0	0.0	1	1.6	0	0.0
8	1	1.7	1	1.6	3	8.8
10	2	3.3	3	4.8	1	11.8
12	0	0.0	7	11.3	10	29.4
14	6	10.0	6	9.7	11	32.4
16	5	8.3	4	6.4	4	11.8
18	4	6.7	6	9.7	2	5.9
20	4	6.7	3	4.8	0	0.0
22	7	11.7	3	4.8	0	0.0
24	4	6.7	0	0.0	0	0.0
26	5	8.3	2	3.2	0	0.0
28	4	6.7	3	4.8	0	0.0
30	0	0.0	0	0.0	0	0.0
32	0	0.0	0	0.0	0	0.0
34	11	18.3	7	11.3	0	0.0
37	0	0.0	1	1.6	0	0.0
≥40	7	11.7	15	24.2	0	0.0

LIP EXTERIOR. Three categories of lip exterior treatment–plain, incised, and notched–were defined in the regrouped attribute list (Table 5.10).

COLLAR/NECK SHAPE. This attribute class relates to whether or not the vessel was collared, and the shape of the junction between the collar and the neck. Four categories, as listed in Table 5.11, were distinguished for the purposes of analysis.

COLLAR HEIGHT. Collar height was initially measured to the nearest mm. Since collar height often increases near a castellation, measurements near these areas were avoided whenever possible. If collar height varied, an average height was determined. For this analysis, five intervals were distinguished (Table 5.12).

The NYSM sample tends to have somewhat higher collars than the sample from SUNY/Buffalo. It has been my observation that this is often the case with older collections. Two possible explanations are:

1. Collectors and excavators of an earlier period tended to miss smaller sherds.
2. Activities such as farming (especially use

Table 5.6. Lip Shapes.

	SUNY/Buffalo		NYSM		Total	
Shape	n	%	n	%	n	%
Flat	83	42.6	198	62.3	281	54.8
Thickened	14	7.2	11	3.5	25	4.9
Rounded	98	50.3	109	34.3	207	40.4

Table 5.7. Lip Surface Treatments.

	SUNY/Buffalo		NYSM		Total	
Treatment	n	%	n	%	n	%
Plain	156	80.4	256	80.5	412	80.5
Incised oblique	15	7.7	33	10.4	48	9.4
Notched	9	4.6	9	2.8	18	3.5
Impressed/stamped	14	7.2	20	6.3	34	6.6

Table 5.8. Rim Shapes.

	SUNY/Buffalo		NYSM		Total	
Shape	n	%	n	%	n	%
Straight, convex	17	8.8	24	7.7	41	8.1
Concave, convex	48	24.7	86	27.7	134	26.5
Convex, straight	5	2.6	1	0.3	6	1.2
Straight, straight	26	13.4	47	15.1	73	14.5
Concave, straight	56	28.9	81	26.0	137	27.1
Convex, concave	29	14.9	42	13.5	71	14.1
Straight, concave	9	4.6	17	5.5	26	5.1
Concave, concave	2	1.0	11	3.5	13	2.6
Convex, convex	2	1.0	2	0.6	4	0.8

Table 5.9. Inner Lip Treatments.

	SUNY/Buffalo		NYSM		Total	
Treatment	n	%	n	%	n	%
Plain	193	100.0	310	96.9	503	98.1
Incsed	0	0.0	8	2.5	8	1.6
Notched	0	0.0	1	0.3	1	0.2
Impressed below lip	0	0.0	1	0.3	1	0.2

> of power equipment) and collecting carried out after the initial collections are made tend to leave smaller sherds remaining on the site.

Collar Design. Twenty-nine possible collar designs were distinguished in this analysis. The original coding allowed for recording a large number of variations in collar design. These variations were then reduced to facilitate comparisons between sites (Table 5.13). The actual designs recorded appear in Appendix A.

Collar Base. There were four treatment categories–smooth, gashes, notches, and punctates–distinguished in this attribute class (Table 5.14).

Collar Appliqué. This attribute class relates to the presence or absence of an appliqué collar as well as the form of such a collar (Table 5.15).

Castellation Information. This attribute class records the presence or absence of a castellation and whether the design under the castellation was the

TABLE 5.10. EXTERIOR LIP TREATMENTS.

Treatment	SUNY/Buffalo		NYSM		Total	
	n	%	n	%	n	%
Plain	187	95.9	305	95.3	492	95.5
Incised	5	2.6	6	1.9	11	2.1
Notched	3	1.5	9	2.8	12	2.3

TABLE 5.11. NECK SHAPES.

Shape	SUNY/Buffalo		NYSM		Total	
	n	%	n	%	n	%
Well-defined collar	37	19.0	94	29.6	131	25.5
Appliqué collar	5	2.6	14	4.4	19	3.7
Poorly defined collar	116	59.5	162	50.9	278	54.2
Non-collared	37	19.0	48	15.1	85	16.6

TABLE 5.12. COLLAR HEIGHTS.

Height (mm)	SUNY/Buffalo		NYSM		Total	
	n	%	n	%	n	%
<12	25	15.8	25	9.3	50	11.7
12-21	120	75.9	197	73.0	317	74.1
22-31	12	7.6	36	13.3	48	11.2
32-41	1	0.6	4	1.5	5	1.2
>41	0	0	8	3.0	8	1.9

same or different than the design on the rest of the collar (Table 5.16).

The NYSM collection has a higher percentage of designs under the castellation which differ from designs on the rest of the collar than do the other collections. As noted above, in the NYSM collection, each vessel was represented on average by 1.4 sherds, while in the SUNY/Buffalo collection, each vessel was represented by 1.1 sherds. It is possible that the greater sherd representation for some vessels in the NYSM collection has affected these frequencies; that is, with a larger portion of a pot represented, there is greater opportunity to record changes in decorative motif.

LIP THICKNESS. Lip thickness was measured to the nearest mm. In this analysis, two size categories were distinguished (Table 5.17).

BASE THICKNESS. The thickness of the sherd at the base of the collar was measured to the nearest mm. This is generally the thickest part of the rim. On non-collared sherds, a thickness measurement was taken 2 cm down from the lip. In this analysis, two size categories were distinguished (Table 5.18). These figures indicate that the NYSM collection contains somewhat thicker rim sherds.

CEMETERY VERSUS VILLAGE

As mentioned previously, the general lack of intrasite provenience information precludes a detailed analysis of possible intrasite stylistic differences. In Table 5.19, the whole pots, presumably from burials, are compared with the other ceramics from Ripley in terms of traditional ceramic types. The percentage of a particular type found among whole pots is compared against the percentage of that type in the general sample. Types found in the Ripley sample, but not represented by whole pots, are not listed here.

While the percentage of Ripley Corded and those pots not assigned to a type are higher for the sample of whole pots, in general the whole pots would seem representative of the total collection. Two of the untyped whole pots were very small, and two were large. In both samples the most common type is Lawson Incised, followed by Niagara Collared, with Ripley Plain coming in a distant third.

TABLE 5.13. COLLAR DESIGNS.

Design	SUNY/Buffalo n	%	NYSM n	%	Total n	%
Plain	97	49.7	135	42.6	232	45.3
Primarily horizontal	7	3.6	7	2.2	14	2.7
Primarily oblique	74	37.9	128	40.4	202	39.5
Vertical and oblique	0	0.0	1	0.3	1	0.2
Opposed oblique with open spaces	4	2.1	24	7.6	28	5.5
Opposed oblique	6	3.1	8	2.5	14	2.7
Opposed oblique with horizontal or vertical lines	0	0.0	2	0.6	2	0.4
Cross-hatched (multiple)	1	0.5	0	0.0	1	0.2
Cross-hatched (single)	1	0.5	0	0.0	1	0.2
Horizontal followed by oblique	0	0.0	1	0.3	1	0.2
Horizontal followed by opposed oblique	0	0.0	1	0.3	1	0.2
Row of punctates	5	2.6	9	2.8	14	2.7
Horizontal line below other decoration	0	0.0	1	0.3	1	0.2

TABLE 5.14. COLLAR BASE TREATMENTS.

Treatment	SUNY/Buffalo n	%	NYSM n	%	Total n	%
Smooth	186	95.4	300	93.8	486	94.4
Gashes	3	1.5	5	1.6	8	1.6
Notches	4	2.1	7	2.2	11	2.1
Punctates	2	1.0	8	2.5	10	1.9

TABLE 5.15. COLLAR APPLIQUÉS.

Appliqué	SUNY/Buffalo n	%	NYSM n	%	Total n	%
Non-appliqué	194	99.5	309	97.2	503	98.1
Vertical barbs	1	0.5	4	1.3	5	1.0
Oblique barbs	0	0.0	4	1.3	4	0.8
Gouges	0	0.0	1	0.3	1	0.2

As noted above, the diameters of the whole pots tended to be smaller than the estimated vessel diameters. There are a number of possible explanations for this.

1. Smaller pots are less likely to be broken than larger pots; hence, the chances of their recovery in one piece is greater.
2. Because of the difficulty in estimating diameter, vessel diameters are consistently overestimated, creating an apparent difference between the size of whole pots and broken ones, when, in fact, little if any difference in size exists.
3. If we assume that whole pots are burial offerings and pot sherds represent village refuse, then size differences between these samples may indicate a cultural preference for inclusion of smaller vessels as grave offerings.

While I favor the third explanation, there is not sufficient evidence at present to resolve this issue.

CERAMIC HOMOGENEITY

In general, ceramics from the Niagara Frontier do not exhibit a high degree of variability. After examining the Ripley Site ceramics, my subjective

Table 5.16. Castellations.

Castellation	SUNY/Buffalo n	SUNY/Buffalo %	NYSM n	NYSM %	Total n	Total %
No castellation	163	91.1	246	81.5	409	85.0
Same design	12	6.7	22	7.3	34	7.1
Different design	4	2.2	34	11.3	38	7.9

Table 5.17. Lip Thickness.

Thickness (mm)	SUNY/Buffalo n	SUNY/Buffalo %	NYSM n	NYSM %	Total n	Total %
1-10	194	99.5	313	97.8	507	98.4
>10	1	0.5	7	2.2	8	1.6

Table 5.18. Base Thickness.

Thickness (mm)	SUNY/Buffalo n	SUNY/Buffalo %	NYSM n	NYSM %	Total n	Total %
1-9	132	67.7	190	59.4	322	62.5
>9	62	32.3	130	40.6	193	37.5

Table 5.19. Whole vs. Incomplete Pots.

Type	Whole Pots n	Whole Pots %	Incomplete Pots n	Incomplete Pots %
Dutch Hollow Notched	1	2.3	6	1.1
Lawson Incised	11	32.4	188	35.6
Niagara Collared	8	23.5	153	29.0
Ripley Collared	1	2.3	9	1.7
Ripley Corded	3	8.8	12	2.3
Ripley Plain	5	14.7	55	10.4
Sidey Notched	1	2.3	1	0.2
Untyped	4	11.8	21	4.0

impression was that this is the case for the Ripley material as well. In order to confirm this impression, coefficients of homogeneity were calculated both for the different ceramic samples and for selected attribute classes in each major sample. The specific attribute classes considered were as follows: (1) collar shape, (2) collar design, (3) lip surface, (4) collar/neck shape, (5) collar height, and (6) collar base treatment.

The following formula was used to compute homogeneity:

$$C = 1 - \frac{2(np - c)}{p\,(N - 1)}$$

where:
C = coefficient of homogeneity
c = the distance from the x axis to the graph line at each successive point
p = the total height of the cumulative graph (here = 100)
n = the number of observed nominal categories represented in the cumulative graph
N = the total number of nominal categories in the set making up the scale

This coefficient is essentially a ratio of the area under a cumulative graph to the area under a graph of maximum variability. The higher the coefficient, the more homogeneous the ceramics.

Coefficients were first calculated for the ceramics in the combined SUNY/Buffalo collection and the small private collection. Coefficients were then calculated for the sample from the NYSM collection. These samples were then combined, and a third set of coefficients was calculated. As can be seen in Table 5.20, the samples do not differ greatly from one another in terms of ceramic homogeneity. The average of the six coefficients for the first sample is .78, and for the NYSM sample it is .77. It is also .77 when the samples are combined. The pattern of variation between attribute classes is also quite similar.

The coefficients from the combined sample were then compared against coefficients from other sites in the Niagara Frontier and the Seneca area (Table 5.21). In general, the pattern of ceramic variation for the Ripley material is quite similar to that of a number of other sites in the Niagara Frontier. The Goodyear Site appears to be the most ceramically homogeneous site on the Niagara Frontier with an average coefficient of homogeneity of .79. The Eaton, Newton-Hopper, and Green Lake sites all have average coefficients of homogeneity of .78, which is quite similar to the Ripley coefficient of .77. The pattern of variation between attribute classes for all of these sites is also quite similar. Seneca sites, in general, tend to be more ceramically heterogeneous, showing somewhat different patterning from Niagara Frontier sites. In terms of patterns of ceramic homogeneity, Ripley fits more closely with Niagara Frontier sites than with Seneca sites.

TABLE 5.20. HOMOGENEITY OF ATTRIBUTES.

Attributes	SUNY/Buffalo	NYSM	Combined
Collar shape	.55	.55	.55
Collar design	.94	.93	.94
Lip surface	.85	.88	.87
Collar/neck shape	.58	.52	.54
Collar height	.84	.81	.78
Collar base	.94	.93	.91
Treatment average	.78	.77	.77

TABLE 5.21. CERAMIC HOMOGENEITY OF SITES.

Site	Collar Shape	Collar Design	Lip Surface	Collar/ Neck Shape	Collar Height	Collar Base Treatment	Average
Western New York Sites							
Ripley	.55	.94	.87	.54	.78	.91	.77
Kienuka	.54	.81	.75	.57	.61	.82	.68
Shelby	.60	.90	.95	.63	.73	.52	.72
Buffum	.47	.94	.84	.69	.74	.70	.73
Eaton	.54	.96	.94	.69	.72	.84	.78
Newton-Hopper	.60	.95	.88	.61	.71	.93	.78
Goodyear	.41	.95	.84	.79	.78	.98	.79
Simmons	.45	.90	.88	.49	.73	.86	.72
Green Lake	.38	.91	.94	.67	.80	.95	.78
Ellis	.39	.92	.98	.19	.75	.85	.68
Kleis	.40	.94	1.00	.19	.80	.80	.69
Silverheels	.61	.69	.90	.29	.38	.72	.60
Seneca Area Sites							
Farrell	.72	.80	.60	.87	.67	.61	.71
Footer	.64	.95	1.00	.63	.83	.38	.74
Belcher	.69	.84	.88	.85	.38	.57	.70
Richmond Mills	.47	.79	.82	.63	.47	.37	.59
Adams	.52	.94	.86	.34	.50	.55	.62
Cameron	.58	.88	.86	.55	.61	.53	.67
Dutch Hollow	.57	.88	.94	.57	.70	.51	.70
Factory Hollow	.54	.90	.88	.63	.67	.69	.72
Cornish	.46	.93	.90	.71	.72	.77	.75
Warren	.52	.85	.92	.49	.56	.66	.67
Powerhouse	.45	.92	.97	.67	.54	.66	.70

CERAMIC SIMILARITY

In order to assess the similarity between the ceramics from Ripley and other Iroquoian sites, Brainerd-Robinson Coefficients of Agreement were calculated between Ripley and 42 other Iroquoian sites. Eleven attribute classes were considered in this analysis: lip shape, lip surface, rim contour, lip interior, lip exterior, collar/neck shape, collar height, collar design, collar base, collar appliqué, and design under castellations. Brainerd-Robinson Coefficients were generated between pairs of sites for each attribute class. These eleven coefficients were then averaged to yield an average coefficient for each pair of sites.

The average coefficients are listed in Table 5.22. The coefficients in the first column are based on the ceramics at SUNY/Buffalo and the small private

TABLE 5.22. COEFFICIENTS OF AGREEMENT.

Site	SUNY/Buffalo	NYSM	Total
Western New York			
Kienuka	167	171	171
Shelby	162	169	167
Buffum	168	173	172
Eaton	169	172	171
Newton-Hopper	178	183	182
Goodyear	176	176	176
Simmons	165	172	171
Green Lake	173	174	174
Ellis	169	173	172
Kleis	165	169	168
Silverheels	158	165	163
Seneca Area			
Farrell	146	149	148
Footer	147	151	150
Belcher	134	140	139
Richmond Mills	137	145	142
Adams	143	150	148
Cameron	137	144	141
Dutch Hollow	141	149	146
Factory Hollow	136	141	139
Cornish	143	148	146
Warren	143	149	147
Powerhouse	145	148	147
Cayuga Area			
Clifton Springs	138	144	142
Klinko	125	126	127
Genoa Fort	136	143	141
Southern Tier			
Englebert	138	145	143
Onondaga Area			
Cemetery	115	120	119
Barnes	119	122	122
Temperance	131	134	134
Atwell Fort	134	139	138
Chase	139	142	142
Oneida Area			
Nichols Pond	117	125	122
Buyer	124	129	128
Bach	134	139	138
Diable	126	136	133
Wayland-Smith	131	138	136
Thurston	125	135	132
Mohawk Area			
Smith	114	121	119
Wagners Hollow	123	129	127
Cromwell	118	123	123
Barker	127	133	131
Martin	114	121	119

collection. The coefficients in the second column are based on the NYSM Ripley material. The coefficients in the third column were calculated using the entire available sample from the Ripley Site.

In almost every case, the ceramics in the NYSM collection (Column 2) yielded higher coefficients than did the combined material in the other two collections (Column 1). The reason for this is not clear. The sample size in both cases is large. The coefficients in Column 1 are based on 195 vessels, while the coefficients in Column 2 are based on 367 vessels. Since the NYSM excavations appear to have covered a large area of the site, it may be that this collection is more representative of the full range of variation at the site. The coefficients of homogeneity suggest similar patterning for both samples.

A coefficient of agreement was also calculated between the different ceramic samples from the Ripley Site. The coefficient of agreement between material from the NYSM and the other two collections was 185. While this is a high value, it indicates that there are some significant stylistic differences between these samples.

DISCUSSION

The two major ceramic collections from the Ripley Site examined for this study are generally quite similar, although not identical. The larger collection from the NYSM contains 34 whole or nearly whole pots, while the SUNY/Buffalo collection lacks any whole ceramic vessels. The vessel, rather than the rim sherd, was the unit of analysis, and vessels in the NYSM collection were more often represented by more than one rim sherd than were vessels in the SUNY/Buffalo collection. In short, the NYSM collection was both larger and less fragmentary than the SUNY/Buffalo collection.

Despite these differences, there were generally comparable percentages of attributes for the following attribute classes: lip surface, rim shape, inner edge of lip, lip exterior, collar/neck shape, collar design, collar base, collar appliqué, and lip thickness. Some differences in percentages were observed for the following attribute classes: diameter, lip shape, collar height, castellation information, and base thickness. The differences in diameter, collar height, and castellation information may be related to the somewhat different nature of the two collections. The whole pots tended to have smaller diameters than did the vessels with estimated diameters. More large sherds with higher collars were preserved in the NYSM collection. The greater design variability evident in the attribute class of castellation information in the NYSM collection may also reflect the fact that whole vessels were present in this collection and that vessels were more often represented by more than one sherd than were vessels in the SUNY/Buffalo collection. The differences in lip shape and base thickness between the two collections cannot be related to the less complete nature of the SUNY/Buffalo sample and may reflect intrasite distributional differences.

In addition to the study of ceramic attributes, vessels were assigned to traditional ceramic types. A comparison of whole pots with incomplete vessels revealed no major differences in the frequency of these types, but the whole vessels did appear to have smaller diameters than those vessels whose diameters were estimated. It is not clear whether this reflects a cultural preference or is a result of the methodology employed or even site formation processes.

The coefficients of homogeneity generated for the Ripley ceramics exhibit a similar patterning to those from other sites in the Niagara Frontier. The Brainerd-Robinson Coefficients of Agreement also directly indicate a clear affinity of the Ripley material with ceramics from sites in the Niagara Frontier. Based on the total available ceramic sample from Ripley (Column 3 on Table 5.22), the Ripley ceramics are most similar to those from the sites listed in Table 5.23. Moving eastward from the Ripley Site, the values of the coefficients decrease. All the coefficients between Ripley and Seneca area sites are lower than those between Ripley and Niagara Frontier sites. The lowest coefficients are those between Ripley and eastern Iroquois sites (i.e., Onondaga, Oneida, and Mohawk). Interestingly, the geographically closest site to Ripley, the Silverheels Site, is the least ceramically similar to Ripley of the western New York sites.

The Ripley ceramics are most similar to those from the Newton-Hopper Site. The coefficient resulting from comparison of these two sites (182) is only slightly less than the coefficient generated between the two major collections from Ripley (185). While coefficients of agreement are generally high between Niagara Frontier sites, the high coefficient between Ripley and Newton-Hopper is unusual. These sites are separated by a distance of approximately 109 km, a distance usually thought to place Iroquoian sites in different tribal areas. No other Iroquoian sites known to me from different areas approach such a high similarity in ceramic attributes. In fact, it is unusual even for sites that are close geographically and temporally.

Perusal of a 42-by-42 matrix of coefficients of agreement between Iroquois sites (coefficients for

Table 5.23. Sites with Ceramics Most Similar to Those of the Ripley Site.

Site	Coefficient
Newton-Hopper	182
Goodyear	172
Green Lake	174
Buffum	172
Ellis	172
Eaton	171
Simmons	171
Kienuka	171
Kleis	168
Shelby	167
Silverheels	163

sites in western New York are shown in Figure 5.8 and relative site locations in Figure 5.9) yielded only three coefficients that were higher. There is a coefficient of 186 between the Goodyear and Green Lake sites. While these sites are both in the Niagara Frontier, the Goodyear Site is believed to be earlier than the Green Lake Site and is postulated to be part of an eastern sequence of village movement (see Chapter 2). The second highest coefficient of agreement (184) occurs between the Cornish and Factory Hollow sites in the Seneca area. These sites are believed to be contemporaneous, and Cornish is sometimes described as a satellite village of Factory Hollow, since it is smaller and located only about 1.6 km away. The high coefficient of agreement between these two sites is therefore expected. There is also a coefficient of 184 between the Ellis and Kleis sites, two Niagara Frontier sites that are believed to be successive occupations of the same village population. Both have an abundance of European material and probably date to the early seventeenth century. Because these two sites probably represent successive locations of the same community, presumably occupied by many of the same potters, the high coefficient between these sites is not surprising.

This study did not compare the Ripley ceramics with those of other Late Woodland sites in southwestern New York. Jack Schock did such a comparison in his doctoral dissertation in 1974. He stated, "The high frequency of collared and decorated vessels and low frequency of shell tempered and sim-

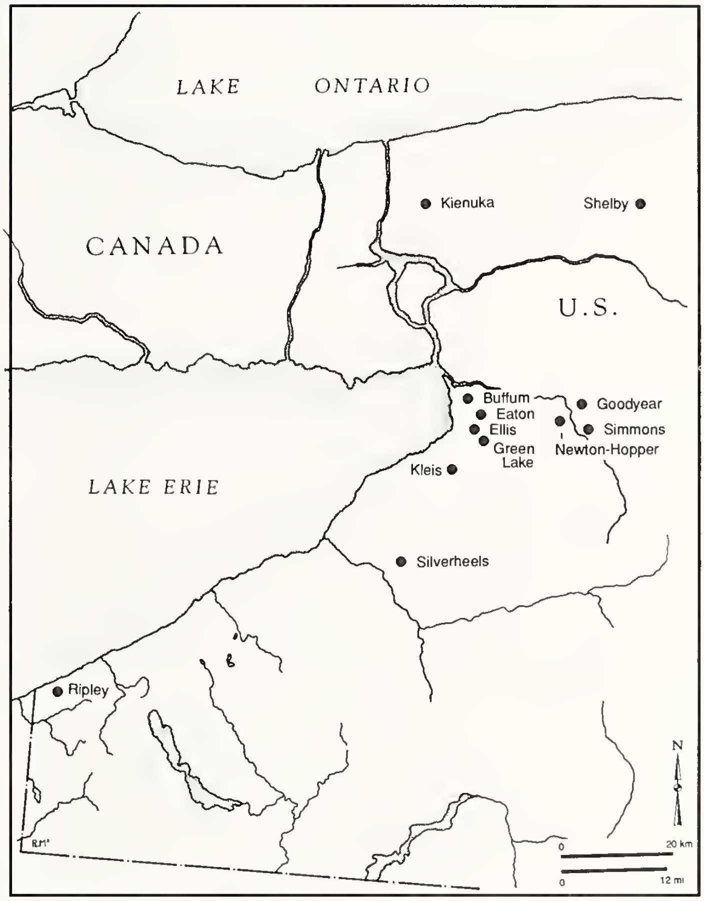

Figure 5.9 Map of relative site locations in western New York.

	Kienuka	Shelby	Buffum	Eaton	Ripley	Newton	Goodyear	Green Lake	Simmons	Ellis	Kleis	Silverheels
Kienuka		171	171	172	171	174	170	169	168	162	157	164
Shelby			177	173	167	176	165	171	165	167	161	162
Buffum				180	172	178	180	180	171	164	159	160
Eaton					171	179	179	180	173	166	161	155
Ripley						182	176	174	171	172	168	163
Newton							179	179	174	171	165	163
Goodyear								186	172	167	162	155
Green Lake									173	171	168	161
Simmons										168	160	161
Ellis											184	168
Kleis												164
Silverheels												

Figure 5.8 Coefficients of agreement between sites in western New York.

ple stamping make Ripley an unlikely candidate for a successor to the late prehistoric Chautauqua phase sites" (Schock 1974:262).

Since there do not appear to be antecedent village locations in the Ripley area, I propose that the population at Ripley was derived from the Niagara Frontier. Since the high coefficient between the Newton-Hopper and Ripley sites suggests a special relationship, I further propose that there was a movement of population from the Newton-Hopper Site to Ripley. The reasons for this proposed movement are at present unclear. Such movement does not appear to be a disruption in the sequence of village movement in the Niagara Frontier, since the nearby Simmons Site is believed to have been occupied after the Newton-Hopper Site.

CHAPTER 6

LITHIC-ASSEMBLAGE VARIABILITY IN THE PARKER COLLECTION

Phillip D. Neusius

This chapter presents the results of a reanalysis of the flaked-lithic assemblage collected by Arthur Parker in 1906 during the course of excavations at the Ripley Site. This reanalysis is the first stage in a larger project examining late prehistoric adaptations to the Lake Erie coastal plain.

A reexamination of the lithics collected by Parker provides a valuable starting point for directing further research at the Ripley Site and other late prehistoric sites in the area. The analysis focused upon four primary concerns. The first was an assessment of the nature of any possible bias in the collection. The second was an examination of the stone-tool assemblage as an indicator of the types of activities conducted at this site. A third was the determination of what lithic resources were being used by the people at Ripley. The fourth was the identification of any distinctions between burial goods and the remainder of the stone-tool collection.

The original report by Parker presents no tabulation of the collected lithic data. As was fairly customary in his day, he mentioned the general types of tools found as indicators of the material traits that defined this archaeological "culture." His field catalogue lists the lithic items as having come from the cemetery, the village, or as of unknown provenience. The Parker collection currently contains some 372 flaked-lithic items. A comparison of these items against the catalogue indicated that many of the original items were missing from the collection, but the exact number could not be determined due to vague notations in the original field catalogue. Overall, it is estimated that less than 10 percent are missing. Of the 372 artifacts included in the current analysis, 93 came from cemetery contexts, 19 came from village contexts, and 260 were unprovenienced.

For the purposes of the current analysis, the collection has been divided into items from cemetery versus those from non-cemetery contexts. One reason for the small number of village-provenienced artifacts is that Parker recorded as village items only those items which were specifically recovered from pit features. Here, the remaining unprovenienced artifacts have been combined with these village artifacts to constitute a non-cemetery sample, which is ultimately related to the village occupation.

METHOD OF ANALYSIS

The method of analysis for examining the Parker lithic collection was devised to emphasize the level of technological input that went into each stone tool. A more traditional analysis emphasizing a chronological typology was not utilized, since this appears to be fairly well documented for the types of stone tools represented in the region during the late prehistoric and protohistoric periods. Rather the intent here was to examine more intensively the types and range of activities represented in the collection through an analysis of the technology utilized in stone-tool production.

Each stone tool was coded for a series of attributes relating to overall morphology and relative level of technological input into the manufacturing process. The attribute list is included in Appendix B. The input variables are loosely based upon a similar analysis developed for the Dolores Archaeological Program in southwest Colorado (Phagan and Hruby 1984). That analysis indicated a general trend towards reduced input into flaked-tool manufacture as people became more reliant upon agriculture as a means of subsistence. This trend did not hold true for certain high-input items associated with ceremonial contexts such as protokivas or kivas and burials.

An initial assumption of this study was that the lithic collection was a biased representation of the lithic assemblage as a whole. This premise was readily verified by the almost complete absence of lithic debitage in the collection. Nevertheless, it was also assumed that an analysis of input into individual items would present at least a gross indication of the types of activities represented by the collection.

Given the reported occurrence of both a cemetery and village area at the site, there should be some differences apparent in the types of tools represented and the level of technological input into those tools.

It was predicted that the artifacts recovered from the cemetery would be somewhat restricted in terms of tool-type diversity but that each tool would exhibit a higher level of technological input. Burial inclusions represent a restricted range of specialized activities, and not all burials have artifacts included with them. This situation necessarily restricts the range of tool types selected for inclusion. Likewise, the decision to include an artifact in a burial entails a level of decision-making leading to the selection of only better manufactured and/or highly curated items.

It was also predicted that the artifacts recovered from the non-cemetery or village context would display a wider diversity of tool types but that individual tools would exhibit a lower level of technological input. The necessities of day-to-day living would require the manufacture and use of a fairly wide variety of tool types. These tools would often be expediently produced and of short-term use.

The following attributes were coded for all lithics in the Parker collection.

Morpho-Use. This category incorporates many aspects of a traditional artifact typology. It is based upon overall stone-tool morphology, but intrinsic to it are certain assumptions concerning types of use. Four broad classes reflect whether the item is unifacial, bifacial, a specialized form (e.g., drill or graver), or not a tool (e.g., flakes and cores). Unifaces are further coded for thickness and placement of the modified margin (e.g., side scraper or end scraper). Bifaces are coded for thickness, the extent of working on the circumference, and the presence or absence of a hafting element. Projectile points are coded for haft-element shape. Specialized tool forms may be coded as notch, denticulate, burin, graver/perforator, drill, flaked axe, or eccentric/ornamental.

Item Condition. This attribute accommodates overall completeness and the portion of the tool remaining if broken.

Facial Evaluations. A ranked evaluation of the level of technological input related to shaping the face is coded for each item. Ventral and dorsal faces are coded separately. The ranking is determined on the basis of the presence/absence of cortex, the invasiveness of the scars, the shape and patterning of the scars, and the symmetry of the outline and section. The ranks range from 1 (for a core or nodule without significantly flattened faces) to 9 (for a highly stylized, extremely symmetrical item with flake scars that are very regular in size and shape). An item with a rank of 7 or above is normally considered a high-input item. An example is a well-made projectile point. An item that shows preliminary shaping only is assigned a rank of 4 to 6. A rank of less than 4 indicates that there has been no facial modification subsequent to the item's removal from a core.

Edge production is distinguished from facial regularization. The primary intent of facial regularization is to achieve overall thinning and symmetry. Flaking related to facial regularization is primarily invasive and directed toward the center point of the item. Edge production is the specific modification, primarily through non-invasive flaking, of the edges to be used as the working portion of the tool or the haft. This flaking is usually the final stage of tool modification for a specific use and is often independent of facial modification.

To avoid confusion in the use of the term "facial," edge production is referred to as directionality, either unidirectional or bidirectional. Thus, a bifacially modified item (e.g., a hafted scraper) may exhibit only unidirectional edge production. In some cases an item may be sufficiently modified during facial regularization that edge production is not necessary. Likewise an item which does not require any facial thinning may have been directionally altered to produce a working edge.

Edge Directionality. This attribute is coded in accordance with a rank based upon the type of technological input applied to the edges or margins of the tool. A tool may exhibit selected and used (rather than produced) edges, unidirectional flaking only, both unidirectional and bidirectional flaking, or bidirectional flaking only.

Edge Placement. This attribute is coded for each tool to reflect the location of edge modification. A tool may show no modified edges, some edges are modified by unidirectional or bidirectional flaking, or all the edges modified by unidirectional or bidirectional flaking.

Results

In investigating the potential biases in the Parker collection, we can identify certain biases. We know that Parker and his crew did not use screens. We also know that their basic field methodology consisted of the crew digging trenches by hand, and when a feature was found, Parker himself mapped and excavated the contents. Given the large area excavated by the small crew, we can expect their collection of lithic items, particularly from non-feature contexts,

TABLE 6.1. FLAKED-LITHIC ASSEMBLAGE IN THE PARKER COLLECTION.

	Total Assemblage		Cemetery	
	n	%	n	%
Debitage	31	8	5	5
Utilized flake	70	19	6	6
Core	57	15	8	8
Uniface	16	4	5	5
Biface	64	17	13	14
Projectile point	130	35	55	59
Drill/perforator	4	1	1	1
Totals	372	100	93	100

to have been sporadic. We therefore predict a bias towards tools over debitage. We also expect a bias towards larger items.

Given these biases, it is perhaps not surprising that there is relatively little debitage in the collection. Of the 372 flaked-lithic items in the collection, only 31 (8 percent) are neither tools nor cores (Table 6.1). These debitage items are made exclusively of Onondaga chert or locally available glacial till.

An indication of the predicted size bias is the relative occurrence of unused cores in relation to the paucity of debitage. Unused cores comprise 15 percent (57 items) of the collection. These items are predominantly glacial cobbles and pebbles that had been split using a bipolar technique with little or no further utilization as a core or tool. Core weights range from 5 to 63 g.

Another 70 items (19 percent) are used but apparently unworked flakes. This number indicates that of the 372 artifacts in the collection, only 158 (or 42 percent) are not tools that have been intentionally modified for use. As a result, the assemblage is not sufficiently representative to be useful for a study of the lithic technology through analysis of debitage, and even the proportions of used flakes and cores is not very representative. The one statement that can be made about the cores is that they indicate a utilization of locally available resources rather than imported or non-local materials.

The remainder of the collection comprises manufactured tools (n=214). The single most common tool category is the small triangular projectile point commonly typed as Madison (Figure 6.1). There are 105 in the Parker collection, representing 49 percent of all the manufactured tools. Other types of projectile points represented include 6 stemmed points, 2 corner-notched points with expanding bases, 5 side-notched points, 2 lanceolate points, and 10 indeterminate points and fragments (Table 6.2). There is a total of 130 projectile points in the

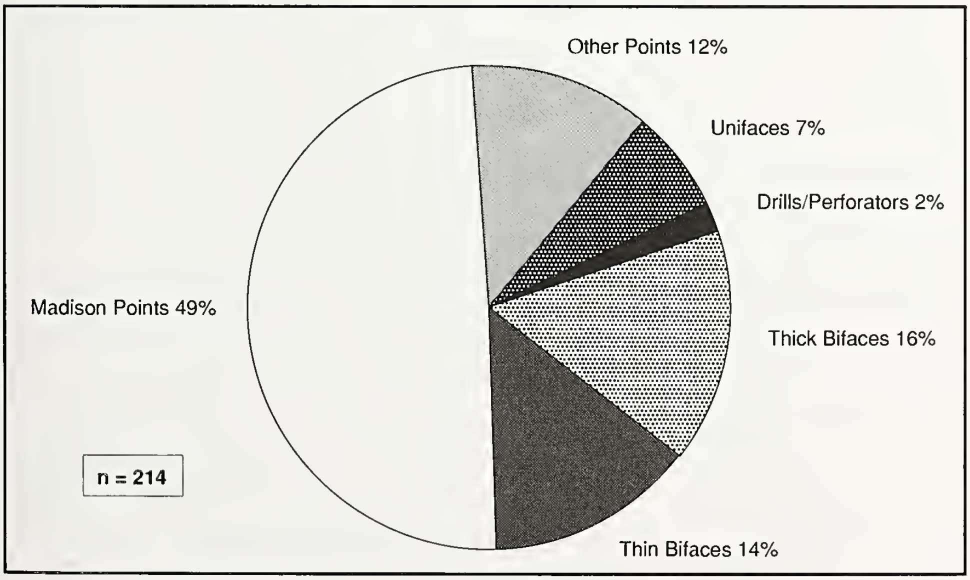

Figure 6.1 Flaked-lithic tools in the Parker collection.

TABLE 6.2. PROJECTILE POINTS IN THE PARKER COLLECTION.

	n	Mean Length (cm)	Range (cm)	Mean Width (cm)	Range (cm)
Triangular	105	3.0	1.8-3.9	1.7	1.2-2.8
Stemmed	6	5.6	3.6-8.1	2.8	2.3-3.7
Lanceolate	2	3.5	3.3-3.7	1.9	1.5-2.3
Corner notched	2	3.2	2.2-4.3	1.9	1.4-2.4
Side notched	5	5.9	3.0-12.9	2.3	1.4-4.4
Indeterminate	10	3.3	2.0-6.9	2.1	1.1-3.3
Total	130				

TABLE 6.3. DORSAL-FACE EVALUATIONS.

Rank	Madison Points		Other Points		Biface Tools		Uniface Tools		Total Tools	
	n	%	n	%	n	%	n	%	n	%
2	0	0	0	0	3	5	3	19	6	3
3	0	0	0	0	3	5	5	31	8	4
4	1	1	0	0	3	5	1	6	5	2
5	0	0	1	4	20	31	7	44	28	13
6	6	8	8	32	15	23	0	0	32	15
7	44	42	12	48	7	11	0	0	63	29
8	54	51	4	16	3	20	0	0	72	34
Totals	105		25		64		16		214	

Table 6.4. Ventral-Face Evaluations.

Rank	Madison Points		Other Points		Biface Tools		Uniface Tools		Total Tools	
	n	%	n	%	n	%	n	%	n	%
2	0	0	0	0	1	2	2	12	3	1
3	0	0	0	0	8	12	13	81	21	10
4	0	0	0	0	4	6	0	0	4	2
5	1	1	0	0	15	23	1	6	18	8
6	4	4	7	28	13	20	0	0	25	12
7	46	44	12	48	10	16	0	0	70	33
8	54	51	6	24	12	19	0	0	72	34
9	0	0	0	0	1	2	0	0	1	0.5
Totals	105		25		64		16		214	

collection, accounting for just over 61 percent of the tools.

There are 31 thin bifaces with partially or completely worked circumferences, accounting for 14 percent of the tools. Thick bifaces with partially or completely worked circumferences account for 15 percent of the tool assemblage, or 33 items. Overall there are 194 bifacial tools, including projectile points, in the collection, accounting for nearly 91 percent of all tools.

The remaining tool collection includes 14 thick unifacial tools, 2 thin unifacial tools, 2 drills, and 2 graver/perforators. The most common uniface is a thick multiple-edge type of scraper. These non-bifacial tool forms are not a significant portion of the total lithic assemblage.

The condition of the artifact assemblage also displays a somewhat skewed distribution. One hundred ninety-eight (or 93 percent) of the tools are complete or nearly complete specimens. Of the remaining tools, 9 are distal fragments, 6 are proximal fragments, and 1 is a medial section. As one of my students working on the collections noted, "It looks like they were hunting for museum specimens." This paucity of broken specimens is particularly notable for the projectile points, with 95 percent of the triangular points and

TABLE 6.5. EDGE PRODUCTION.

Rank	Madison Points		Other Points		Biface Tools		Uniface Tools		Total Tools	
	n	%	n	%	n	%	n	%	n	%
Directionality										
None	47	45	10	40	19	30	1	6	78	36
Unidirectional	9	9	2	8	9	14	15	94	36	17
Combined	16	15	9	36	16	25	0	0	42	20
Bidirectional	33	31	4	16	20	31	0	0	58	27
Totals	105		25		64		16		214	
Placement										
No edges	47	45	10	42	19	30	1	6	78	36
Some edges	24	23	7	28	28	44	13	81	74	35
All edges	34	32	8	32	16	25	2	12	61	28
Indeterminate	0	0	0	0	1	1	0	0	1	0.5
Totals	105		25		64		16		214	

100 percent of the notched, stemmed, and lanceolate points being complete specimens. This proportion of complete specimens would seem to indicate a strong bias in favor of collecting whole specimens.

The analysis of the facial regularization for the stone tools in the Parker collection indicates a high level of technological input. This is particularly notable in the collection of small triangular projectile points. The dorsal-face evaluations for these points were coded as 7 or 8 for 93 percent of the items (Table 6.3). Only one item is coded less than 6. Dorsal-face evaluations are normally higher than ventral, since they require more input to make a flat face. One of the primary tasks of facial regularization is to remove the dorsal spine. However, in this collection, the ventral-face evaluations are slightly higher, with 95 percent of the tools coded 7 or above (Table 6.4).

This level of facial modification seems unusual for the normally utilitarian, small triangular arrow point. In particular, the high level of input on the ventral (or plano) face can be interpreted as an intent to modify beyond mere section symmetry, although a broader range of comparative samples is required to test this preliminary interpretation.

The remaining projectile points have similarly high facial evaluations as do the thin bifaces with completely worked circumferences. The partially worked thin bifaces and the thick bifaces have facial evaluations in the middle range of values. The unifacial tools have relatively little if any facial modification.

The type of edge modification on the small triangular projectile points is also somewhat unusual (Table 6.5). There is no edge modification at all on 45 percent of the small triangular projectile points. Another 9 percent have unidirectional edge production, 15 percent have a combination of unidirectional and bidirectional edge production, and 31 percent have bidirectional edge production.

The combined factors of edge production and facial regularization indicate something other than the expedient utilitarian tool type normally conceptualized for small triangular projectile points. The high degree of facial regularization combined with a lack of edge production indicates a fairly high level of skill or input in fashioning the shape of the tool while thinning it. A more efficient means of manufacturing this utilitarian item involves the edge modification of a flake to fashion a small point, with a small amount of dorsal thinning to remove any ridge. The level of input on the ventral faces of items in this collection indicates an intent to improve the item beyond utilitarian needs. The lack of edge modification could also be an indication that the tools were not utilized.

A significant number of the stemmed and side-notched projectile points and thin bifaces also show little or no edge modification. The corner-notched and lanceolate points have substantial edge modification. The thick bifaces display a wide range of edge production values, although most are somewhat lower than those of the thin bifaces and projectile points. The unifacial tools display only unidirectional edge production.

The high values recorded for technological input and the possible indication of lack of utilization could be seen as a potential bias from inclusion of a sample of artifacts from burial contexts. It is possible that flaked-lithic grave goods were intentionally manufactured for inclusion with the graves, as opposed to being personal items of the deceased. The cemetery-related flaked lithics were analyzed separately to test this hypothesis.

TABLE 6.6. PROVENIENCE OF FLAKED-LITHIC TOOLS.

	Cemetery		Non-Cemetery		Total	
	n	%	n	%	n	%
Uniface	5	7	11	8	16	7
Biface	13	18	51	36	64	30
Triangular points	48	65	57	41	105	49
Other points	7	9	18	13	25	12
Drills, perforators	1	1	3	2	4	2
Totals	74		140		214	

As with the entire site assemblage, the most common flaked-lithic tool associated with the cemetery is the small triangular projectile point (Table 6.6). Of the 74 flaked-lithic tools associated with the cemetery, 65 percent (48 artifacts) are these triangular points. This is a considerable increase over the 49 percent noted for the site assemblage as a whole. In general, all the other types of tools found in the site assemblage occur in cemetery contexts but in slightly reduced proportions (Figure 6.2). In addition, 100 percent of the artifacts from cemetery contexts are complete specimens.

The facial evaluations for tools from the cemetery are also similar to those of the total assemblage. All but one of the triangular projectile points have levels of technological input coded as 7 or 8 for the dorsal and ventral faces. The remaining tools from cemetery contexts likewise show no significant difference in facial evaluation from those of the total assemblage.

Of the triangular points associated with the cemetery, 67 percent have no edge modification. Of the remaining 7 non-triangular points from cemetery contexts, only one shows any edge modification. This may indicate that these tools were made exclusively for inclusion with burials. The lack of edge modification similarly may indicate that they were not utilitarian items prior to their use as grave goods, although at this point the lack of comparative data from other or similar contexts makes these interpretations tenuous.

The 105 triangular projectile points were analyzed further. Seventy points have straight bases, and 35 have slightly concave bases. The mean length is 3.0 cm, with a range from 1.8 to 3.9 cm. The mean width is 1.7 cm, with a range from 1.2 to 2.8 cm. The overall length-to-width ratio is 1.87. These points are somewhat large for Madison points (Justice 1987; Ritchie 1961), but they are distinctly isosceles in shape and generally smaller than Levanna points.

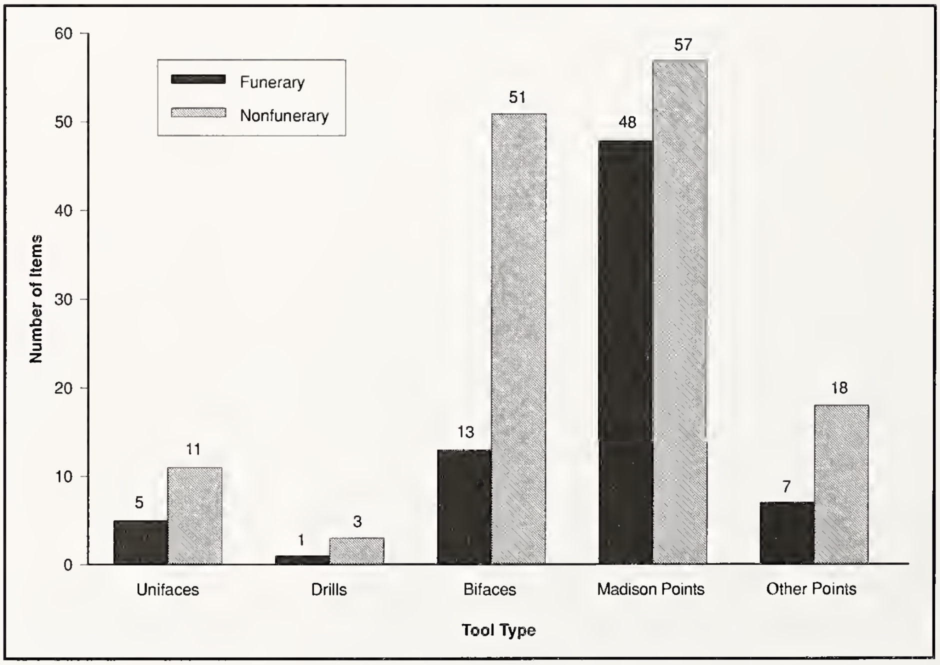

Figure 6.2 Flaked-lithic tools in cemetery vs. non-cemetery contexts.

Bradley (1987) has noted a pattern of increasing length-to-width ratio for the late prehistoric phases in the Onondaga Core Area. This was followed by a decrease in length-to-width ratios for the protohistoric Onondaga as the points become closer to equilateral in shape. He has suggested that this pattern can "provide one more material basis for placing sites in sequential order" (Bradley 1987:63). A comparison of the Ripley ratio to those in the sequence presented by Bradley places the Ripley Site in the late fifteenth century.

Recently published data from four Seneca sites (Wray et al. 1987, 1991) dated to the late sixteenth century also display length-to-width ratios distinct from those of Ripley. The two earlier sites, Adams and Culbertson, have ratios of 1.62:1 and 1.66:1, respectively. The two later sites, Tram and Cameron, have ratios of 1.33:1 and 1.23:1, respectively. This pattern is similar to that noted by Bradley for increasingly equilateral shape through time during the Contact Period.

Admittedly, using data from the Onondaga Core Area or even the Seneca area is not without risk, but comparable data are not readily available for the western New York area. Schock (1976) has presented projectile point data from five sites of the Late Woodland Chautauqua Phase. All these points are smaller and more equilateral than those from Ripley. Points from Whittlesey sites in northeastern Ohio are also smaller and more equilateral in shape (Brose 1973; Brose et al. 1976; Murphy 1971a, 1971b). This may be related to the assumed earlier dates for these sites as would be predicted by Bradley's suggestion.

White's report of the Historic Iroquois Von Son Cemetery near Buffalo (1968) mentioned six flint triangular points recovered from three burials. These points are all larger than any points from Ripley and have an overall length-to-width ratio of 2.33:1. This contradicts Bradley's observation of an increasing equilateral shape during the protohistoric period, although it is important to recognize that White's sample size is extremely small.

A recent analysis of projectile points from the Eaton Site in West Seneca, New York, presents a length-to-width ratio of 2.03 (William Engelbrecht, personal communication 1992). This site is estimated to be late prehistoric or early protohistoric. The larger ratio at this site may indicate that the site is somewhat earlier than Ripley.

Although length-to-width ratios may be used to suggest a date for Ripley from late fifteenth to early sixteenth century, this would seem premature. At this time there are not sufficient comparative data to utilize projectile point styles for a chronological placement of Ripley.

CONCLUSIONS

It is apparent that there are certain biases in the Parker collection. The excavators obviously made no attempt to collect a representative sample of flaked-lithic debitage from the site, and indeed there is a strong bias in favor of tools over debitage. There does not seem to be a bias towards larger tools, however. The most common type of tool recovered is the small triangular projectile point. In addition to the bias resulting from excavation methodology, the lack of provenience for most of the items also limits the types of analysis that can be conducted.

Nevertheless, an analysis of the flaked-lithic tools does present us with some hypotheses worth testing. Overall, there is an unusually high proportion of small triangular projectile points, and they exhibit a somewhat unusual level of technological input. The level of input for facial regularization is much higher than would be expected on utilitarian items, and a high proportion of tools show no edge modification. This combination of factors points to the production of stylized points that were never used and perhaps were never intended for use. The higher proportion of this type of input for points from the cemetery indicate their use as grave goods. It is interesting to note that this pattern occurs throughout the site and not just from the cemetery.

The unusually large proportion of small triangular points for the site assemblage as a whole coupled with the general absence of diversity in other types of tools may support the argument that much of the activity at Ripley was mortuary in nature. We do not see the normal range of village activities represented in the flaked-lithic assemblage. Since we do not have a representative sample of debitage in the Parker collection, we cannot ascertain whether the projectile points were manufactured at the site or were brought to Ripley as finished tools.

Although at this point we do not have comparative technological-input data from other sites of this period, we can make comparisons of morpho-use tool traits. As a point of illustration, we can compare the Ripley sample to the materials collected from the 1988 field season at the Eaton Site (Engelbrecht 1988). The lithic collection from Eaton contains some 103 projectile points (36 percent of the total lithic assemblage), but this includes both whole and fragmentary specimens. Only 37 (14 percent of all flaked-lithic tools) were complete. In contrast, there were 97 scrapers, a tool category that is very poorly represented in the Parker collection. Overall, the Eaton Site collection includes a fairly diverse sample of tool types (Figure 6.3), which is what would normally be

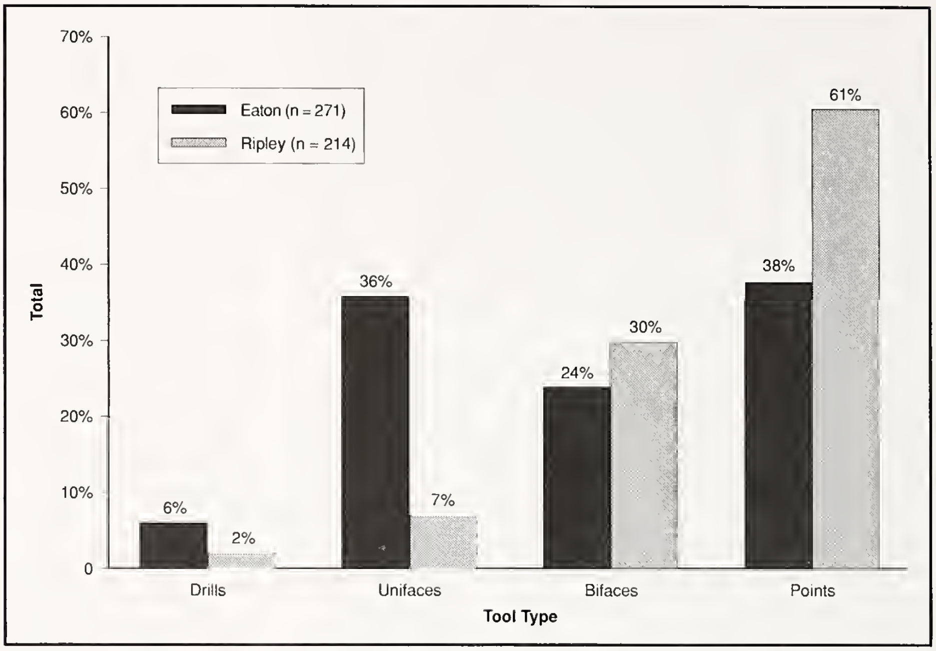

Figure 6.3 Comparison of Eaton and Ripley Site flaked-lithic tools.

found in a village site where a broad range of activities were being conducted.

At the Ripley Site, on the other hand, we have an extremely high proportion of bifacial implements, notably projectile points. A flaked-lithic collection with this restricted range of variation would normally be construed as representing a specialized activity area related to hunting and butchering. The specific nature of the technological input associated with these tools coupled with the context of a large mortuary complex instead may suggest activities related to burying the dead. A lack of comparative data relevant to stone technology makes this suggestion tenuous at this point and subject to further testing. Nonetheless, the restricted tool range still indicates a fairly specialized type of occupation and not "your normal village."

The recent publication of burial context data from the Seneca Adams and Cameron sites (Wray et al. 1987) reveals a pattern similar to that at Ripley. Both Adams and Cameron have large proportions of triangular projectile points. At the Adams Site, 50 percent of the tools are triangular points (n=288). However, more than twice as many unifaces are reported for these sites than are represented in the Parker collection from Ripley. This discrepancy may be related to Parker's sample bias or to differences in coding definitions. The large proportion of projectile points from these burial contexts supports the idea that the Ripley assemblage may indeed reflect mortuary activities.

Further research at Ripley, particularly the ongoing analysis of materials from the 1988-1992 excavations, will allow us to test some of these hypotheses. To date, the attempt to test our hypotheses by looking for comparative lithic analyses at Iroquoian sites has presented some interesting and unanticipated problems. Even the limited lithic data cited for the Eaton Site come from an unpublished source provided by Engelbrecht. Using this manuscript necessitated the assumption that Engelbrecht's classification is similar to that used here. For example, his category "scraper" was interpreted as roughly equivalent to a "uniface" in the system here. Until more precise definitions of classifications are used by researchers, however, it will always be possible that we are comparing apples and oranges.

A similar problem can be noted in the lithic data presented by Bradley (1987). An examination of the sources cited for his lithic data reveals that he had to rely on manuscripts published by local chapters of the amateur New York State Archaeological Association, and for the protohistoric period, he had to record the data from existing amateur collections.

The data from the Seneca sites seems to present one of the best comparisons for examining lithic collections from burial contexts (Wray et al. 1987, 1991), but this also presents some problems in making comparisons. These publications report the results of analyses of burial excavations from sites interpreted as villages with no comparable data for the village areas themselves. They indicate the occurrence of nearly twice as many unifaces from these sites as from Ripley, but once again this discrepancy could be related to differences in classification and identification rather than true differences in the collections.

Our current study of the lithics from Ripley appears to be one of the most comprehensive analyses of this type of data from an Iroquoian or Iroquoian-related site. A review of the literature indicates a general lack of concern for utilizing or even comprehensively reporting assemblage data on past lithic technology. Many of the data are grossly generalized with little or no attempt to interpret the past. Ceramics and settlement pattern studies are the primary focus for most published accounts of Iroquoian prehistory. This reflects a very heavy emphasis on attempts at ethnic identification, group movement, and chronology building.

Part of the problem with conducting intensive lithic analysis at a site such as Ripley is this lack of comparative data. When I make an observation that there is a restricted range of behaviors at the Ripley Site indicating a focus on burial of the dead, I am relying upon an intuitive perspective on what appears to be an unusual pattern of diversity in lithic tool types. However, when I attempt to compare these data to "known" Iroquoian sites, there is little basis for comparison. Lithic databases are not published in adequate detail to assess the nature of these assemblages. Lithic tool categories are not defined, and the actual sample size for each category is sometimes not presented. Particularly frustrating are statements such as the following:

> A quantity of artifacts was recovered from the village area...The projectile points are triangular and are made from the local grey Onondaga flint. Other flint tools are scarce, and chipping debris indicates that some were manufactured on the site. Especially noticeable is the small number of scrapers, compared to their abundance on historic sites where they may reflect the increased activity in fur trading [White 1963:54-55].

Does this description reflect a situation similar to the one observed at Ripley? It is tempting to cite it as support for what we conclude from our observations, but it is impossible to say with any certainty, short of reanalyzing the actual collection.

It is probably not the case that these lithic tools have not been counted and analyzed. Rather, they are not adequately reported because of a perspective that such analysis is not important for the research at hand. For example, a recently published Iroquois symposium (Hayes 1991) presents a summary of recent Iroquois research and suggestions for future research. The seven contributions make interpretations utilizing ceramic, settlement, osteological, European trade item, and even botanical data, but there is not a single mention of any type of lithic data in the entire volume. There also is no mention of site function. All the sites from this time period are assumed to be villages, but we have not critically evaluated this assumption.

It appears that many of the Iroquoian studies suffer from some of the same methodological problems that plagued historic archaeology as recently as ten years ago. There appears to be an underlying assumption that we know or understand the nature of these cultures based upon the historical data available and the general continuity of these cultural traditions into the present. Yet, many historical archaeologists now acknowledge the unique contribution of archaeological data for challenging our perspectives about culture in historical periods. These "revisionist" interpretations are adding significantly to our understanding of the past. It is time for Iroquoianists to think beyond the perspective that we have an adequate model for understanding these cultures and reexamine the basic archaeological data from these sites. We need to interpret the nature of the activities at each site and look beyond simply placing these sites into an existing ethnic and chronological framework.

CHAPTER 7

FAUNAL ANALYSIS AND THE PARKER COLLECTION

Sarah W. Neusius

The Parker collection from the Ripley Site is notable in including a sizable amount of animal bone and shell that is both modified and unmodified. The existence of this faunal assemblage is a tribute to the thorough and progressive nature of Arthur Parker's archaeological work as well as to the New York State Museum, which has curated these materials for nearly 90 years. Certainly such treatment particularly of unmodified faunal remains was not common in the early decades of this century.

Since the materials are also in an excellent state of preservation, those of us involved in the Ripley Archaeological Project have been interested in what might be learned from this assemblage. Preliminary study has convinced me that detailed faunal analyses of these materials must be limited because of the lack of contextual control and the probability of bias from collection techniques. Nonetheless, preliminary examination of the faunal materials collected by Parker has been valuable to RAP because it has suggested several research questions or problems that should be addressed and that will contribute to our perspectives on the function of the Ripley Site.

For these reasons, it is important to include some discussion of the Parker faunal assemblage in this volume, and it is the purpose of this chapter to report on the preliminary examination of these materials. The chapter begins with a discussion of the condition of the assemblage and proceeds through a consideration of implications for resource selection and habitat utilization, followed by an examination of bone-tool technology. These are topics of interest to the Ripley Archaeological Project, and the preliminary results reported here are informing further work with Ripley Site materials.

CONDITION AND RELIABILITY OF THE ASSEMBLAGE

There are 4,689 faunal specimens from the Parker collection available for examination. The New York State Museum catalogue suggests that some additional specimens, including a number of bone tools, may have originally been in the collection. Our observations indicate that nearly all the museum numbers for which bone cannot now be found were assigned to single items. Thus, although I cannot determine the precise number of faunal specimens possibly collected and misplaced, I am confident that this number is small enough to be insignificant to the composition of the Parker faunal collection.

These faunal specimens generally are in good condition and display little of the deterioration reported by Parker for some of the human skeletal remains. Most of the bones are resilient and have not been extensively weathered. Minimal exfoliation of the surfaces of these bones can be observed, but this is too minor to have resulted in the obliteration of morphological features. Fish, bird, and mammal bones all appear to be well preserved, and the shell fragments included in the collection are fragmented but moderately well preserved. The good condition of the faunal remains supports the other indications that most of them were recovered from Parker's village area at the crest of the knoll. In this part of the site, the sediments at and just below the surface are sand and sandy loams. Subjective observations during our excavations suggest that bone preservation is poor in the clay at the base of the knoll at the southern edge of Parker's cemetery area.

Burning is quite rare in this assemblage, and calcined bone is virtually non-existent. Although most of the specimens have not been thoroughly identified, the relatively high degree of skeletal element completeness in the Parker collection is striking as is the extremely low occurrence of recent breakage. In these characteristics, the faunal specimens collected by Parker do contrast with the highly fragmented, often burned specimens collected in the 1988-1992 excavations by the Ripley Archaeological Project. Surely, this contrast is at least partially due to the more than 80 intervening years since Parker's excavations and to

TABLE 7.1. ANIMAL-BONE MODIFICATION AND PROVENIENCE INFORMATION FOR THE PARKER FAUNAL COLLECTION.

	Provenience Known	Provenience Unknown	Total
Modified by humans	113	88	201
Unmodified by humans	3	4,485	4,488
Total	116	4,513	4,689

TABLE 7.2. DISTRIBUTION OF PROVENIENCED ANIMAL BONE WITHIN THE RIPLEY SITE.

	Village	Cemetery	Total
Modified by humans	104	9	113
Unmodified by humans	3	0	3
Total	107	9	116

the extensive plowing of the site during this period. It may also be that burned and broken bone fragments were much less likely to be saved by Parker than more recognizable unburned and larger fragments.

Most of the Parker specimens are unmodified (Table 7.1), but 201 items show human modification. This number is significant as it represents 4.3 percent of the total faunal collection. The potential for bone-tool analysis also is good because many of the worked specimens (56 percent) come from known proveniences within the site.

Provenience information in general is unavailable for the unmodified bone (Table 7.1). While nearly half the modified-bone fragments are associated with a particular trench and/or pit feature in Parker's notes, 97.6 percent of the collection as a whole cannot even be assigned to the village as opposed to cemetery area. However, since 92 percent of the provenienced faunal material comes from Parker's village area (Table 7.2), most of the bone may come from the village area as well. Certainly, it would make little sense that refuse bone would be concentrated in the cemetery area.

Considered together, these characteristics of the faunal material suggest that, with the exception of bone tools recovered during the excavation of pits. the Parker faunal collection is a "grab sample" of bone encountered by Parker and his workmen. That is, it appears that Parker saved non-human bones when they were worked, when they were large and complete, when they were easily recognizable, or when they might have been confused with human bone (i.e., many large mammal bones including human bones look alike to the untrained eye). Since Parker certainly did not screen, there would be further bias toward the bones of the larger animals (Payne 1972, 1975). Thus, the representativeness of this sample of bone and its reliability in terms of many of the questions now commonly asked by faunal analysts are marginal. Nevertheless, preliminary study of these faunal materials has been far from pointless. Within limitations, there are several specific studies of these materials that can be undertaken.

First, preliminary sorting of the faunal material into taxonomic classes raises some questions about the nature of habitat utilization and resource selection at the Ripley Site. These questions cannot be fully answered without a more representative sample of faunal material, but the questions themselves would not have been raised without some study of the Parker faunal collection.

Second, more detailed study of the bone tools included in the collection is warranted. Although more provenience information is available for these specimens than for the unworked materials, the bone-tool assemblage still may not be fully representative. Nevertheless, description of the bone tools is important as it may provide significant comparative information on bone-tool technology, a topic that has not been thoroughly studied by archaeologists. As long as the potential for bias is not forgotten, this kind of study may be important to RAP and to other investigations of Northern Iroquoian groups.

There may also be potential for addressing questions about the past distribution of various species. In this case, only presence/absence information is required. For example, thorough identification of

Table 7.3. Preliminary Sort of the Parker Collection Animal Bone.

Class/Subclass[1]	NISP	%[2]
Large Mammal	3,712	88.2
Medium/Large Mammal	202	4.8
Small to Medium Mammal	293	7.0
Total Mammal	4,207	90.8
Bird/Mammal	34	0.7
Bird	70	1.5
Reptile or Amphibian	2	–
Fish	266	5.8
Invertebrate	33	0.7
Other	19	0.4
Total	4,631[3]	100.0

[1] The class and subclass designations listed here are summary groupings resulting from the combining of the actual categories used during preliminary sort. The categories actually used were: unidentifiable/uncertain, invertebrate, indeterminate mammal, medium or large mammal (≥ 4 kg), medium mammal (4-30 kg),large mammal (>30 kg), small or medium mammals (≤30 kg), small mammal (< 4 kg), mammal or bird, indeterminate bird, large bird (turkey size), medium bird (duck size), small bird (sparrow size), reptile, amphibian, and fish.

[2] Percentages in this column are of the total NISP except for the mammalian subclass percentages which are of the mammalian NISP only.

[3] Taxonomic identification even to class or family has not been completed for all of the specimens in the Parker faunal collection. Hence this number does not match the total in Table 7.1.

the fish in this assemblage may be relevant to biogeographical questions about the precontact aquatic fauna of Lake Erie. This kind of study has not been started, but it is planned.

Habitat Utilization and Resource Selection

Due to the high potential for bias in the Parker collection, full-scale analysis of the taxonomic composition has not been undertaken. Preliminary studies included a sort into vertebrate classes and into subclasses such as large mammal and small mammal (Table 7.3). Although the gross categories of the sort precluded quantification except by NISP, it did raise several questions that have become critical in our approach to study of animal exploitation at Ripley (Neusius 1989a, 1989b). These questions also have figured in our consideration of the function of the Ripley Site as discussed elsewhere in this volume.

Based on Parker's (1907) description and interpretation, it generally has been assumed that the Ripley Site was an Erie Indian village with an associated cemetery area. This interpretation has been accepted (e.g., White 1978), even though virtually nothing is known about Erie lifeways. Because this assumption has general implications for the nature of the procurement and usage of animals, it structured our initial approach to the Parker faunal collection. We also assumed that animal exploitation at Ripley generally was similar to that of other Iroquoian groups (Fenton 1978).

If the Ripley Site does represent a village site rather than a special-purpose encampment such as a fishing or hunting camp, the utilization of a variety of habitat types would be expected. Webster (1983:140-141) believed that Northern Iroquoian hunters utilized four general habitat types. The first of these was the lake-riverine area in which fish, waterfowl, aquatic reptiles, and amphibians were collected. Streams, marshes, and ponds also were exploited (stream/marsh habitat). According to Webster, otter, fisher, beaver, muskrat, and raccoon were the major animal resources in this second habitat type. Since most of the land area occupied by the Northern Iroquoians was forested, a third important habitat type would have been the upland hardwood forest. Of the many potential prey species in the forest, Webster has listed deer, fox, bobcat/lynx, squirrel, chipmunk, quail, grouse, turkey, pigeon, mountain lion, wolf, and bear as important. Finally, the old field/man-made prairies habitat is recognized as important to Northern Iroquoians because elk, deer, woodchucks, rabbit, skunk, crow, raven, and mice would have been found there.

The similarities between Webster's habitat types and the resource zones I have outlined earlier in this volume (see Chapter 3) are obvious. I have used these zones to make sense out of the natural environment of the Ripley Site, but Webster's work suggests that they also have meaning in understanding Northern Iroquoian animal exploitation. For the specific catchment of the Ripley Site, two forest zones must be recognized: the beech-maple forest of the Erie Lowland and the mixed coniferous-deciduous forest of the Allegheny Plateau. Many of the same animal species would have been found in both zones. Another minor difference is that natural prairie openings probably did occur in the Erie Lowland, so that forest openings in the vicinity of Ripley were not exclusively old field settings, but a combination of old fields and natural prairies. This distinction does not seem critical with respect to animal species, but as noted in Chapter 3, it may be an important issue in understanding human adaptations. Finally, since large rivers are not present in the immediate vicinity of the Ripley Site, I have used the word "riverine" to describe the stream and marsh habitat type to which Webster refers. Thus, my riverine resource zone and Webster's stream/marsh habitat type should be understood as effectively the same.

Table 7.3 gives the result of a preliminary sort of the faunal materials in the Parker collection. Although specific habitat preferences cannot be assessed from these data, it is still striking that fauna such as fish, reptiles, and waterfowl from aquatic zones are poorly represented. This impression is supported by the small sample of material that has been more thoroughly identified (Table 7.4). This sample includes provenienced bones and shell fragments and many of the unprovenienced bone tools, which have been more thoroughly identified in the process of beginning other studies. Comparison of the summary percentages indicates close similarity to those given in Table 7.3, although bird and bird/mammal bones are more common and fish is less so. The question that must be raised is where are the aquatic fauna? At least superficially, it would seem that a village site situated on the edge of Lake Erie should contain aquatic fauna. Four alternate hypotheses can be suggested:

> 1. Fish, waterfowl, and aquatic mammals were not so abundant in the Ripley catchment as to make them likely prey preferences.
> 2. These species were procured and consumed away from the village so that their remains were not commonly introduced into the site deposits. The village was seasonally occupied.
> 3. The procurement activities undertaken at the Ripley Site were more limited. Site function is not understood.
> 4. The assemblage is biased against these types of fauna due to either collection technique or preservation.

These alternate hypotheses cannot be evaluated until thorough analysis of more representative samples such as those collected from 1988 through 1992 is complete. There already is some reason to doubt Number 4 as an explanation, based on the work we have just begun with our presumably less biased collection from the Ripley Site. Table 7.5 presents the results of a preliminary sort of the material we collected in 1988, using screening and flotation for recovery techniques. The proportions of remains in each gross category are strikingly similar to those shown in Table 7.3, except with respect to the medium/large mammal and large mammal categories. I suspect the greater degree of fragmentation of these collections has reduced the number of fragments that securely can be considered large mammal. In addition, there is more invertebrate material in the 1988 collection.

I also began examining the Parker faunal collection with ideas and expectations about the nature of game-procurement strategies in mind. One fundamental assumption behind my expectations has been that game procurement among horticulturalists is not structured in the same manner as game procurement among mobile hunter-gatherers (Neusius 1990, 1995). Sedentism and social organization, as well as the time and energy requirements of growing crops, affect when and how game is procured in such groups. Thus, the seasonality of game procurement is not dictated by species distribution and abundance alone.

Among Iroquoian groups, a marked division of subsistence tasks by gender seems to have been the rule. Men undertook the task of field clearing, but the remainder of the horticultural labor was women's work (Parker 1968; Trigger 1976, 1990). This division of labor freed men for long-distance hunting, trading, and making war during the growing season. Particularly in the Historic Period when the fur trade became so important (Webster 1983), it may be inaccurate to envision hunting by males as a key contribution to group provisions on a year-round basis (Webster 1983:173). Warring and trading were important activities for Iroquoian males during the summer, while the amount of meat procured was greatest in the fall when selective hunts were undertaken. Webster (1983:165-175) has reconstructed the seasonality of Northern Iroquoian animal exploitation in more detail. Meat for subsistence probably was procured incidentally to other activities for most of the year. For women and children tending the crops, garden hunting (Linares 1976) or the procurement of species attracted to gardens and fields, and fishing must have been the primary source of high quality protein during the growing season (Webster 1983). Garden hunting is a common strategy among horticulturalists (Neusius 1990, 1995) because it solves potential scheduling conflicts between food-producing activities and hunting. Among some horticulturalists, selective driving of animals preying on crops has been reported (Beaglehole 1936), but this type of garden hunting is not known among the Iroquoian groups. The Iroquoian case is interesting because garden hunting appears to have been necessary even with the strict division of labor by sex that would allow men to participate in selective, long-distance hunting.

This generalized reconstruction of game-procurement strategies leads to the expectation of a faunal assemblage with several key characteristics. Not only should this assemblage contain fauna from both terrestrial and aquatic habitats, but diversity of species should be a characteristic as well. Such diversity would reflect the non-selective nature of

Table 7.4. Identification of a Sample of the Parker Collection Animal Bone.

Taxonomic Identifications	NISP	%
Indeterminate Large Mammals	22 (24)[1]	38% (32%)[2]
Ursus americanus		
Black Bear	1 (5)	2% (7%)
Cervus elaphus		
American elk	3 (7)	5% (10%)
Odocoileus virginianus		
White-tailed Deer	26 (30)	45% (41%)
Cervidae		
Deer and Elk Family	6 (8)	10% (11%)
Total Large Mammal	58 (74)	56% (58%)
Total Medium/Large Mammal	11 (13)	11% (10%)
Indeterminate Medium Mammal	4 (6)	40% (40%)
Castor canadensis		
Beaver	5 (5)	50% (33%)
Canis familiaris		
Dog	1 (2)	10% (13%)
Procyon lotor		
Raccoon	0 (2)	10% (13%)
Total Medium Mammal	10 (15)	10% (12%)
Total Small Mammal	11 (11)	11% (9%)
Total Small Mammal	9 (10)	9% (8%)
Total Indeterminate Mammal	5 (5)	5% (4%)
Total Mammal	104 (128)	72% (74%)
Total Bird/Mammal	23 (23)	16% (13%)
Indeterminate Large Bird	7 (9)	78% (69%)
Meleagris gallopavo		
Wild Turkey	2 (4)	22% (31%)
Total Large Bird	9 (13)	75% (72%)
Total Medium Bird	2 (3)	17% (17%)
Total Indeterminate Bird	1 (2)	8% (11%)
Total Bird	12 (18)	8% (10%)
Chelonia		
Turtles	1 (1)	100% (100%)
Total Reptile/Amphibian	1 (1)	1% (1%)
Indeterminate Fish	1 (1)	50% (50%)
Ictaluridae		
Catfish Family	1 (1)	50% (50%)
Total Fish	2 (2)	1% (1%)
Total Indeterminate	1 (1)	1% (1%)
Grand Total	144 (174)	99% (100%)

[1] Figures in parentheses indicate the NISP or the percentage when specimens identified as "compares favorably" rather than "certain" are included.

[2] Percentages of the subclass are given for species and family identifications. Percentages of class are given for subclasses, and percentages of the total are given for the classes.

the garden-hunting strategy as well as the variety of different game-procurement strategies employed at any village. In addition, smaller-bodied species should be reasonably important because many smaller animals are abundant within the garden environs and they can be procured at low cost. Large mammals, particularly deer, that are known to frequent fields and gardens also should be represented, but large mammals are not expected to be the dominant constituent of an assemblage representing garden hunting. Since presence in or near fields and gardens rather than biomass per individual is most important to prey selection in garden hunting, selection for large mammals is not predicted (Neusius 1990). As noted above, ethnographic accounts emphasize selective, long-distance hunting by males among Northern Iroquoians (Webster 1983:144-145). Deer and elk were principal targets of these hunts, and for these species, body-part representation at a village site may have been affected by field dressing and transport over long distances.

Tables 7.3 and 7.4 suggest that, in contrast to our expectations for garden hunting, there is a marked predominance of large mammals in this assemblage.

Table 7.5. Preliminary Sort of the Ripley Faunal Assemblage Collected in 1988.

Class/Subclass[1]	NISP	%[2]
Large Mammal	2,409	40.6
Medium/Large Mammal	3,152	53.1
Other Mammal	377	6.4
Total Mammal	5,938	85.1
Bird/Mammal	57	0.8
Bird 16	0.2	
Reptile/Amphibian	7	0.1
Fish	342	4.9
Invertebrate	618	8.9
Total	6,978	100.0

[1] The class and subclass designations listed here are summary groupings resulting from combining the actual categories used during preliminary sort. The categories actually used were: unidentifiable/uncertain, invertebrate, indeterminate mammal, medium or large mammal (> 4 kg), medium mammal (4-30 kg), large mammal (>30 kg), small or medium mammal (< 30 kg), small mammal (< 4 kg), mammal or bird, indeterminate bird, large bird (turkey size), medium bird (duck size), small bird (sparrow size), reptile, amphibian, and fish.

[2] All percentages in this table are of the total NISP except in the case of the mammalian subclasses which are percentages of the mammal NISP.

Diversity (evenness) is also low. Although these preliminary data are not conclusive, since neither species identifications nor body-part identification have been attempted, this assemblage is not consistent with a non-selective garden-hunting strategy. If this patterning continues to be found as more analysis is done, three possible explanations will have to be considered. First, garden hunting may not have been practiced or may have been of only minor importance in provisioning the Ripley Site. Second, the Ripley Site may not be a typical village site as is generally assumed. Finally, the recovery techniques may have produced bias in the taxonomic composition.

It is not possible to discuss these ideas or expectations more meaningfully until data are available to test them. This process is only beginning and does not involve the Parker faunal collection, but even this preliminary sort has led to the identification of two research questions, which constitute the focus of detailed analyses of faunal remains recovered during the 1988, 1990, and 1992 IUP/NYSM excavations. These are:

1. Are the resources of the aquatic habitats in the Ripley catchment underrepresented in the Ripley faunal assemblage? If so, what is the significance of this finding?
2. Is there evidence for garden hunting and other incidental hunting in the Ripley faunal assemblage? Why or why not?

Resolution of both these questions will be relevant to the larger question of site function. It might be argued that both a lack of fish and a low species diversity are indicative of some special, non-village function of the Ripley Site. Styles and Purdue (1986) have argued that these characteristics are associated with a Middle Woodland mortuary encampment at the Napoleon Hollow Site in Illinois. If study of more reliable faunal assemblages continues to support the impressions gained from the preliminary sort of the Parker faunal collection, the possibility that the Ripley Site is a mortuary encampment should receive further attention. Further investigation of this idea must include comparisons with faunal assemblages from other Northern Iroquoian sites. Collections from Seneca villages (e.g., Wray et al. 1987, 1991) may provide some idea of whether the patterning in the Parker assemblage from Ripley is as atypical for a village as initially assumed, but the published data from the Seneca sites seem to be from grave contexts alone. Webster's (1983) detailed study of Northern Iroquoian hunting may also be useful, although the Susquehannocks he studied were both spatially and temporally distant from the Ripley Site inhabitants. Until it is possible to make comparisons such as these, the functional interpretations raised here will remain tentative and unconfirmed.

BONE-TOOL ANALYSIS

While the topics of habitat utilization and resource selection cannot be fully explored using the faunal materials in the Parker collection, it seems likely that other studies for which context is less of an issue will be more productive. One of these topics involves analysis of the bone tools in the assemblage. Although the study of this material is still ongoing (Neusius 1989a), the preliminary results are reported here, since they may be of interest to others working with bone-tool collections from Iroquoian sites.

Several variables have been considered in examining the worked bone collected by Parker. There is provenience information for 56 percent of the 201 specimens, but most of this material comes from the village area. For each item the following characteristics have been coded:

1. the condition of the item (weathering, percent analyzable, and tool portion)
2. a typological assessment (morpho-use categories)
3. shape measurements (item length, functional length, item width, functional width, and functional cross section)
4. tool production information (production

stage, extent of morphological alteration, item production techniques, and decoration)
5. indications of use and maintenance (macroscopic use-wear and maintenance or resharpening techniques).

The data on condition confirm the subjective impression that this collection of bone tools is in excellent shape and warrants further study. Pitting was recorded on the surfaces of 10 percent of the tools; splitting was observed on 21 percent of the items, and exfoliation was recorded for 16 percent. Most of the tools (53 percent) show no evidence of weathering whatsoever. Condition also was encoded for the proportion of each tool that can be studied, as opposed to the proportion that was weathered or altered to a point where measurements and observations would be meaningless. For 68 percent of the specimens, the entire tool is analyzable. An additional 11 percent of specimens are coded as at least 75 percent analyzable, while for 17 percent of the items, this percentage could not be determined. In addition, the tools tend to be complete rather than fragmentary, with 80 percent of the specimens consisting of both the functional and the haft or handle portions.

Since the Ripley Site has been assumed to represent a village with an associated burial area, I expected that there would be a variety of everyday (utilitarian), ornamental, and ceremonial tool types in the bone-tool assemblage. The testing of this expectation is difficult because typologies of bone tools are poorly understood. Archaeologists often assign worked-bone items to tool types based only on implicit assumptions about the functional meaning of various shape attributes. In addition, care has not always been taken in describing the morphological characteristics of bone tools. A familiar example would be bone awls, which are long, thin, pointed pieces of bone variously assumed to have been used in leather working or basketry. Distinctions between awls and needles and pins, which are also long, thin, and pointed, remain ill-defined. In general, needles and pins merely are smaller in size than awls. As in this example, both the function and the attributes of many bone-tool types require further study before typological comparisons between collections are meaningful.

Nevertheless, some assessment of the types of tools present is part of the description of this collection of bone tools. A variable labeled "morpho-use" was created to record these traditional kinds of typological assessments. Considering these assignments along with shape variables at least should clarify what morphological characteristics are associated with each kind of bone tool. Comparison of these data with similar data from other bone-tool collections may contribute to more adequate descriptions of what is meant by tool types such as awls and flakers.

Table 7.6 lists the bone tools according to morpho-use categories. Information on length, width, and a ratio of length to width are also given for each category. The functional–as opposed to item–length and width refer to that portion of the bone specimen actually used. The variables do not differ in the cases of some categories but may be of significance in others where handles or haft portions are present.

The high standard deviations and the large ranges should be noted. These suggest that the metric attributes of these various morpho-use categories are not mutually exclusive. This may mean that replication of these morpho-use categories would be difficult, or it may mean that other variables are the discriminating factors in assignment to morpho-use category.

Cross-section shape of the functional portion also was recorded for each specimen. Table 7.7 lists the frequencies of cross-section types according to morpho-use category. The greatest diversity in cross-section shape occurs among the awls, while spatulas display the least variability. These differences may be due in part to sample size.

Although any functional determinations for these tool categories should be used with caution, it does seem reasonable to group items into those of presumed utilitarian value, such as awls and flakers, versus those of presumed ornamental or ceremonial value, such as beads and gaming pieces. Some morpho-use categories (e.g., other pointed implements) cannot be confidently assigned to one or the other of these general functional groupings, so a third subgroup must be recognized. In this categorization, 23.9 percent of the specimens fall into the utilitarian class, 45.7 percent fall into the non-utilitarian class, and 30.4 percent are in the indeterminate class.

Since comparative data from other Iroquoian village sites with associated burials are lacking, it is difficult to assess the significance of these percentages. The proportion of these tools which may represent non-utilitarian items does seem high. This is particularly true because most of these specimens (74 percent) came from the village area. This observation could be significant in view of the ongoing discussions about the function of the Ripley Site. Low representation of utilitarian items could be an indication of a special-purpose mortuary site, but it is not clear that the observed percentages are unusual for Iroquoian habitation sites.

TABLE 7.6. MEASUREMENTS OF BONE ARTIFACTS BY MORPHO-USE CATEGORIES.

Morpho-Use Category	NISP	%	Length (mm)		Width (mm)		Length/Width	
			A	B	A	B	A	B
Awls	32	15.9	84.0[1] 42-144 25.2	43.9[1] 12-10 24.5	10.7[1] 14-27 5.2	7.3[1] 2-19 4.2	9.1* 3-20 3.7	6.7* 2-15 3.0
Needles/Pins	6	3.0	78.0 17-116 23.9	70.8 24-116 32.7	5.5 3-7 1.5	5.2[1] 3-7 1.5	15.3 8-26 6.5	13.7[1] 5-16 8.1
Spatula	2	1.0	207.5 160-155 67.2	207.5 160-255 67.2	15.0 13-17 2.8	15.0 13-17 2.8	13.7 12-15 1.9	13.7 12-15 1.9
Flakers	7	3.5	88.6 51-240 67.9	56.4 31-70 14.3	13.4 7-28 7.4	13.3 7-32 9.1	6.5 4-9 1.5	5.2 2-8 2.0
Fishing Hook	1	0.5	58.0 – –	58.0 – –	8.0 – –	8.0 – –	7.3 – –	7.3 – –
Tubes/Beads	67	33.3	35.2 10-81 17.7	35.2 10-81 17.7	11.6 5-57 6.6	11.6 5-57 6.6	3.8 0.2-10 2.4	3.8 0.2-10 2.4
Other Non-Utilitarian	25	12.4	34.0 13-101 19.6	34.0 13-101 19.6	12.3 6-33 5.3	12.3 6-33 5.3	3.5 1-17 3.4	3.5 1-17 3.4
Other Pointed Tool	11	5.5	78.0 30-169 37.5	63.5 19-169 42.5	13.2 1-45 12.0	12.6 1-37 10.2	14.1 2-84 23.5	13.2 1-84 23.9
Other Edge or Surface Tool	11	5.5	103.6 43-274 76.4	79.6 10-205 56.3	25.5 6-68 24.0	27.1 6-75 26.8	6.6 2-23 7.0	6.2 0.1-23 7.3
Indeterminate	39	19.4	55.8 26-170 27.7	56.4 26-170 27.8	14.1 6-62 8.9	14.1[1] 6-62 9.0	4.4 2-11 1.9	4.4[1] 2-11 1.9
Total	201	100.0						

All measurements are given in millimeters.
Length A: length of entire item; Length B: length of functional portion of item
Width A: width of entire item; Width B: width of functional portion of item
Length/Width A: length/width of entire item; Length/Width B: length/width of functional portion of item

[1] The N has been reduced by one because in one case a measurement was not taken.

Table 7.7. Cross-section Shapes of Bone Artifacts by Morpho-Use Categories.

Morpho-Use Category	N [%]	Round [%]	Flat-Thick [%]	Flat-Thin [%]	U-Shaped [%]	Triangular [%]	Irregular [%]	Indeterminate [%]
Awls	32 [99]	6 [19]	1 [3]	3 [9]	11 [34]	1 [3]	10 [31]	0 [0]
Needles/ Pins	6 [100]	0 [0]	0 [0]	5 [83]	0 [0]	0 [0]	1 [17]	0 [0]
Spatula	2 [100]	0 [0]	0 [0]	2 [100]	0 [0]	0 [0]	0 [0]	0 [0]
Flakers	7 [99]	5 [71]	1 [14]	1 [14]	0 [0]	0 [0]	0 [0]	0 [0]
Fishing Hook	1 [100]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]	1 [100]	0 [0]
Tubes/ Beads	67 [100]	32 [48]	14 [21]	1 [1]	0 [0]	0 [0]	20 [30]	0 [0]
Other Non-Utilitarian	25 [100]	1 [4]	3 [12]	2 [8]	0 [0]	0 [0]	19 [76]	0 [0]
Other Pointed Tools	11 [99]	2 [18]	2 [18]	4 [36]	0 [0]	0 [0]	3 [27]	0 [0]
Other Edge or Surface Tools	10[1] [100]	0 [0]	4 [40]	4 [40]	0 [0]	1 [10]	1 [10]	0 [0]
Indeterminate	39 [100]	14 [36]	14 [36]	4 [10]	2 [5]	0 [0]	4 [10]	1 [3]

[1] Cross section was not recorded for one specimen assigned to this morpho-use category.

Information on the production of these bone tools also is intriguing but presently inconclusive. Most of the specimens (94 percent) are clearly in a finished stage of production. This fact is true whether the items might be considered utilitarian (95.9 percent) or non-utilitarian (96.7 percent). Even 86.7 percent of the specimens placed in the indeterminate-function class are finished. Once again, it is not clear whether these figures are unusual for a village site, although we might expect that since tool production would have been a constant activity in a village, more unfinished items would have been recovered than the 2 percent included in this collection. It is also possible that Parker's crew did not consistently save unfinished tools because their exhibit value was low.

Examination of the techniques used to produce these tools leads to two observations. First, the most common manufacture techniques utilized horizontal force (79 percent). This includes all techniques for which the vector of force at contact with the bone would have been essentially horizontal. Thus, polishing, striating, smoothing, grinding, sawing, drilling, grooving, shaving, and carving all fall into this category, while pecking, crushing, battering, flaking, and breaking (which were the main production techniques for 13 percent of the specimens), would be considered vertical force.

Second, if production techniques are subdivided into the relative amount of energy expended in application, high-energy or -input techniques appear to be most common. If roughing, crushing, battering, and breaking are considered low-input techniques and flaking, striating, and sawing are considered moderate-input techniques, then pecking, polishing, smoothing, grinding, drilling, grooving, shaving, and carving are high-input techniques. The predominant production technique on 65 percent of the specimens is one of this latter group of high-input techniques as shown in Table 7.8.

This table also shows that high-input techniques apparently were more commonly used in the manufacture of tools placed in the utilitarian class than in the production of those placed in the non-utilitarian class. When only tools for which the utility class and the production technique can be determined are considered, statistical tests indicate that this relationship is significant (chi square 5.017 a=.08; Tau B -.135 a=.051).

The meaning of this observation is unclear. One would not expect utilitarian tools to receive as much attention in manufacture as ornamental or ceremonial items, but in this case the opposite may be true. These data may indicate that these "utilitarian tools" actually were manufactured for non-utilitarian purposes such as placement in graves. Higher input techniques may also be less critical to the manufacture of beads and bone tubes than to the manufacture of awls and needles.

Two other observations about production may support the latter rather than the former expectation. First, these tools lack decorative incising or other surface treatment that might be expected if they were funerary objects. Only 8 of the 201 items in this collection show such decoration. Second, the proportion of these specimens that have been morphologically altered in manufacture generally is low. Only six items (3 percent of the specimens) appear to have had more than 60 percent of their original morphology altered during production. As shown in Table 7.9, items in the non-utilitarian class show less morphological alteration than do those in the utilitarian class, and this relationship is statistically significant (chi-square 37.968 a=.00; Tau B .331 a=.00). A factor in this relationship is the large number of bone tubes or beads. Production of these items required minimal alteration of naturally shaped bird bone.

Macroscopic evidence of use and maintenance is a final area of study for the bone implements. For the purposes of this report, we did not attempt to examine any of these specimens under the microscope. The traces of use and maintenance that were recorded were only those that were grossly obvious. Forty-six percent of the tools showed some evidence of use, but only one tool was coded for maintenance, and this specimen showed signs of shaving. Polish, smooth surfaces, striations, and grooves were the most common traces of use visible without a microscope. For utilitarian tools, polish and striations were most frequently observed. Grooving was recorded most often for non-utilitarian tools. Microscopic analysis should be undertaken to better examine the question of use-wear.

In summary, we were able to make a number of observations concerning bone tools in the Parker collection, but the significance of these observations is not always clear. Interpretation is hampered by how little is known about bone-tool technology in general and by the dearth of comparative data about bone tools from other Iroquoian sites. For example, the descriptions of bone and antler artifacts from Seneca villages (Wray et al. 1987, 1991) is informative but not immediately comparable. Also important to remember is that the Ripley bone-tool assemblage may have been biased by collection techniques. As a result of these problems, the discussion of bone tools in this chapter has been primarily descriptive. It is hoped that presenting preliminary

TABLE 7.8. PRODUCTION TECHNIQUES FOR EACH CLASS OF BONE TOOL.

Class[1]	NISP [%]	Indeterminate[2] [%]	Low Input[3] [%]	Moderate Input[4] [%]	High Input[5] [%]
Utilitarian	49 [100]	1 [2.0]	2 [4.1]	8 [16.3]	38 [77.6]
Non-utilitarian	92 [100]	1 [1.1]	16 [17.4]	13 [14.1]	62 [67.4]
Indeterminate	60 [100]	14 [23.3]	7 [11.7]	9 [15.0]	30 [50.0]

[1] The utilitarian class includes awls, needles and pins, spatulas, flakers, and fishing hooks. The non-utilitarian class includes tubes and beads and other ornamental specimens. The indeterminate category includes other pointed tools and other edge/surface tools as well as totally unknown tool types.
[2] Indeterminate or no evidence of production technique
[3] Roughing, crushing, battering, or breaking
[4] Flaking, striations, and sawing
[5] Pecking, polishing, smoothing, grinding, drilling, grooving, shaving, and carving

descriptive information will stimulate similar analyses of bone-tool collections by other students of Northern Iroquoian groups.

CONCLUSIONS

The faunal remains included within the Parker collection are in good physical shape, but as this chapter has indicated, their usefulness in the analysis of the Ripley Site must be limited. First, although the specific collection techniques for this material remain unknown, there is considerable reason to believe that collection has biased the representativeness of this sample of bone in some ways. As a result, taxonomic identifications cannot be converted to reliable indicators of habitat usage or procurement strategy. In addition, the percentages of different types of bone tools must be interpreted with caution because some types of bone tools may have been overlooked during excavation. Second, the lack of provenience information for the materials in this collection further limits potential analyses. Intrasite spatial studies simply are not possible, and even simple comparisons between the village and the burial area cannot be made because most of the provenienced faunal material comes from the village.

On the other hand, preliminary studies of these faunal materials have been very useful to the process of studying the Ripley Site. This study has forced the definition of general expectations concerning subsistence and for bone-tool usage. Where these expectations have not been supported, it has been possible to develop new research questions to be explored by the ongoing project. In a very real sense, even our limited analyses of the faunal materials have made it possible for us to know what questions to ask of the more reliable data collected from 1988 though 1992. Since the faunal materials we have collected ourselves are much more fragmented than those in the Parker collection, the latter faunal assemblage may always be an important source of some kinds of information. Finally, even our preliminary findings may be useful to other scholars. Certainly, they are part of reanalyzing the Ripley Site.

ACKNOWLEDGMENTS. The taxonomic sorts of the Parker materials and of the faunal remains recovered in 1988 initially were completed with the assistance of Renee Beauchamp Walker, then an undergraduate at Indiana University of Pennsylvania. Without her help we would know much less than we do about the faunal materials in the Parker collection. The coding of the bone tools in the Parker collection was completed with the assistance of John Mutchka while he was an undergraduate at Indiana University of Pennsylvania. His interest in the bone tools from Ripley has stimulated other research on bone modification and has been important to the ongoing Ripley Archaeological Project.

TABLE 7.9. EXTENT OF ALTERATION FOR EACH CLASS OF BONE TOOL.

Class[1]	NISP [%]	Indeterminate [%]	Not Shaped [%]	<20% Shaped [%]	20-60% Shaped [%]	>60% Shaped [%]	Completely Shaped [%]
Utilitarian	49 [100]	0 [0]	9 [18.4]	32 [65.3]	7 [14.3]	1 [2.0]	0 [0]
Non-Utilitarian	92 [100]	0 [0]	60 [65.2]	16 [17.4]	16 [17.4]	0 [0]	0 [0]
Indeterminate	60 [100.1]	6 [10.0]	27 [45.0]	13 [21.7]	9 [15.0]	4 [6.7]	1 [1.7]

[1] The utilitarian class includes awls, needles and pins, spatulas, flakers, and fishing hooks. The non-utilitarian class includes tubes, beads, and other ornamental specimens. The indeterminate category includes other pointed tools and other edge/surface tools as well as totally unknown tool types.

CHAPTER 8

POPULATION DYNAMICS, HEALTH, AND MORTALITY

Richard G. Wilkinson

The analysis of skeletal material from archaeological sites normally has as its goal the demonstration of one or more of the following: adaptation to the natural and cultural environments, genetic and/or social relationships within and among groups, and aspects of social organization (Buikstra 1981). The analysis of the skeletal material from the Ripley Site follows this general model. Adaptation to the multiple environments is implied in the discussion of nutritional and health markers observable in the skeletal material, and differential frequencies of activity-induced pathology provide information on consequences of a sexual division of labor in the population. Aspects of the social organization, as reflected in mortuary behavior, are suggested by the mortality patterns derived from the age and sex distributions of the several skeletal samples from the Ripley Site. Biological relationships, in the form of genetic distances, have not been assessed for the Ripley material. Sublett (1966) noted a similarity between the general cranial morphology of a Ripley sample and a diverse protohistoric Seneca sample, but contemporary statistical techniques have not yet been applied to this particular problem. Such an approach is beyond the intention of this study, and it is not clear that extant Ripley skeletal material is sufficient for such a task.

Unfortunately for those of us interested in the reconstruction of prehistoric human behaviors from skeletal data, one cannot jump directly from the skeletal data to the three (or more) analytical outcomes listed above. Interposed between the skeletal data and reconstructed behaviors are a series of filters which reduce the database, our interpretive security, or a combination of these. Formation processes, post-depositional processes, and the belief systems of the target population have a critical influence on our interpretations and on what we treat as data. The skeletal material from the Ripley Site is very strongly affected by these filters and others specific to the circumstances of excavation and curation. Data loss, negative evidence, and interpretive insecurity are relatively abundant in this study, and the advisability of continuing the work has been a recurrent question.

The question has clearly been answered in the affirmative, and the primary reasons have to do with the inherent challenge in working with incomplete material from an important site and with the current debate surrounding the scientific use of archaeological skeletal material. The study and restudy of skeletal material in museum collections is the only justification for the existence of such collections, and it is clear that extant museum collections will be the only ones available for anthropological research in the immediate future. Beyond this immediate future, the preservation of collections is increasingly problematic. The analyses that follow hopefully will demonstrate, as have many others, the continued importance of museum collections for advances in our understanding of past populations.

THE RIPLEY SKELETONS AS A MORTUARY SAMPLE

The skeletal samples from a site constitute a heavily filtered subset of those dying in the original population. Cultural filters act to exclude certain groups from the cemetery (Bender 1979), and natural filters, such as differential decomposition and loss, can result in the underrepresentation of certain subsets of the original burial population. At Ripley, we see the effect of cultural filters in the probable underrepresentation of infants, children, and adult males (enumerated below), and the many references to "bone dust" attest to the natural filtering effects of decomposition. The "empty graves" of Parker (1907) may be more evidence for natural filtering, but they may also indicate a cultural filter, should they represent village members who died away from the village and/or under special circumstances.

The Ripley Site is fairly typical in exhibiting these types of data-destroying filters. The site data have also been the victim of archaeological filtering. As detailed in Chapter 4, the site was excavated by many non-professional archaeologists and early twentieth-century professionals, whose combined methodological inadequacies and minimal record-keeping have resulted in the loss of vast quantities of information critical to our endeavors. Post-excavation filtering has further reduced the data available for our analyses; it appears that only the Harrington skeletal material–and then not all of it–has been properly curated. The effect of all of this filtering is the reduction of the original skeletal database from several hundred potential skeletons to several dozen.

Arthur C. Parker reported finding 101 graves (Parker 1907); of these, 23 have either no bones or only "dust." Only 39 of the graves were described as being in good enough condition to yield recoverable skeletal material. Whatever skeletal material Parker did recover was never catalogued or numbered, and we have only the minimum-number-of-individuals approach to guide us at this point. The 39 graves that held potentially recoverable material could have yielded 51 individuals; we have a minimum of 36 individuals in the Parker collection, none of which can be positively associated with any of the original graves. The Christensen and Conklin samples have been subjected to similar fates with roughly equivalent results. The Conklin material was used by Audrey Sublett in her dissertation (Sublett 1966), and she noted the presence of 23 individuals, 7 of which were subadults. Conklin's field identifications are summarized in Table 8.1, and he described 22 burials; we are unable to verify his sex determinations, as his field numbers are no longer associated with the skeletal material.

AGE AND SEX DISTRIBUTIONS

The determination of age at death and the sex of the individuals interred within an archaeological site is essential for attempts at reconstructing the demographic processes that operated within the population. Age and sex are also critical in the assessment of a wide range of cultural behaviors, especially in societies characterized by horizontal, as opposed to vertical, social differentiation. The analysis of the effects of stress on a population is considerably more meaningful when treated from an age- and sex-specific approach.

To attempt a reconstruction of the age and sex distributions of the mortuary sample, two approaches are necessary. First, we can consider the age and sex information as presented by, or inferred from, the original excavators. These data are summarized in Table 8.1. The categories are those most frequently used by the excavators, with the exception of the "unknown" column, which represents burials having no description other than "skeleton" or the equivalent. The accuracy of the age groupings (infant, child, adult) is difficult to determine. Certainly, the excavators were able to distinguish between adults and children, and they often referred to young adults, old adults, and adolescents. No doubt they could also distinguish between neonates and older children, but the terms "infant" and "child" are too ambiguous to support any kind of reasonable inference about real age. In the Harrington field notes, one skeleton of an 18-month-old is referred to as an infant, while another of the same age is called a child. Sex determination was made infrequently by the excavators, or at least it is infrequently reported in the notes or publications. Since the Harrington collection is the only one to have preserved its provenience information, I can only comment on his sex determinations with any real confidence. Of the 22 individuals identified by Harrington as adults, he offered a sex identification for 8, and 2 of his males are, I believe, females. Given the relatively great amount of sexual dimorphism within prehistoric North American populations,

TABLE 8.1. AGE AND SEX DATA AS DETERMINED BY THE EXCAVATORS.

	Age and Sex						
Excavator	Infant	Child	Unknown Adult	Adult Female	Adult Male	Unknown	Totals
Parker	7	9	11	30	28	30	115
Christenson	4	2	7	6	4	40	63
Conklin	1	8	6	5	2	0	22
Harrington	7	6	14	3	5	3	38
Totals	19	25	38	44	39	73	238

TABLE 8.2. AGE AND SEX OF THE EXTANT SKELETAL COLLECTIONS.

	Age							
Sex	0-3	4-10	11-20	21-30	31-40	41-50	50+	Totals
Unknown	7	3	1					11
Males			1	3	7	2	2	15
Females			6	12	4	2	2	26
Totals	7	3	8	15	11	4	4	52

these excavators were probably correct more often than not, but we lack any means of quantifying their accuracy.

From an original skeletal sample of 238 individuals, there remain 52 which are complete enough to provide the basis for sex and age estimates. The majority of these are from the Harrington excavations. Summary statistics of the age and sex distributions of the skeletal sample are reported in Table 8.2.

The small sample makes interpretation somewhat difficult, since statistical significance cannot be demonstrated with any of the differences that appear obvious in the table. Assuming for the sake of discussion that the differences observed in the age and sex distributions are real and not due to sampling error, some interpretations of the distributions are possible. The adult sex ratio, consisting of 15 males and 26 females, would seem indicative of differential burial treatment as opposed to differential mortality. The females have a somewhat lower median age at death than the males, due mainly to the preponderance of deaths among the young adult females and the apparent low male mortality in this age group. The discovery of at least two deaths associated with childbirth would emphasize a probable cause of young adult mortality among females. In addition, three of the adult females show evidence of cranial trauma, which in turn suggests interpersonal violence within the female segment of the population.

The males are most clearly characterized by their relative absence, especially in the young adult category. The male-female ratio of 1:1.7 (37 percent male, 63 percent female) is considerably lower than the 1:3 ratio reported by Sempowski and co-workers (1988) for one of the Adams Site cemeteries, but nonetheless unusual. High male:female sex ratios are also known from several Ontario Iroquoian sites, but an equal number of sites in this area have essentially equal sex ratios (Jackes 1986:34). Differential preservation and "typical" burial treatment differences yield more males than females in an archaeological mortality sample. To find the opposite demands our attention, even if the numbers are not large enough to create statistical significance.

Assuming the reality of the differences, either the males had a considerably improved survivorship compared to the females, or the males were dying elsewhere, or at least were being interred elsewhere. Improved male survivorship is more unlikely because male mortality is higher than female mortality at all ages in nearly all populations. There is no reason to create a unique case for Ripley mortality. The presence of males with fatal arrow wounds, as described below, provides the best evidence for death occurring elsewhere, with warfare victims not being returned to their village for burial. Special burial rites are suspected to have been held for males from the St. Lawrence Iroquois Roebuck Site (Pendergast 1983), but here the male:female ratio was nearly 1:10 (4 males, 39 females). A 1:2 ratio is also reported for the Tabor Hill Ossuary (Churcher and Kenyon 1960), with young adult males being notably absent (cf. Jackes 1986); their absence is explained as being due to warfare-related mortality. Sex ratios similar to Ripley's are also known from several Contact Period sites in New England (Baker 1994:40), but warfare is only one of several factors that can account for the unequal sex distribution. Removal of males from the local group for educational or occupational reasons may have been the case in these post-contact societies (Baker 1994) but obviously not at Ripley. The historic Huron are somewhat overused as ethnographic analogies for northeastern prehistoric populations (McManamon et al. 1988), but we can note that death in battle precluded inclusion in the Feast of the Dead (Tooker 1964).

The age distributions presented in Tables 8.1 and 8.2 demonstrate some interesting differences. The subadult portion of the four early excavators' samples is 44 of 165 identifiable individuals, or 27 percent. The demarcation between adult and subadult is arbitrary here, corresponding to the amount of visible epiphyseal union, at best. The subadult portion of the extant skeletal collection is 18 of 55, or 35 percent. The inexactness of the two subadult categories, "infant" and "child," in Table 8.1 and the absence of a young adult or adolescent category makes comparisons between the two tables difficult. Once again, assuming the basic representativeness of our skeletal sample, a mortality profile based on the data in Table 8.2 would bear a general resemblance to those derived from larger samples at two Ontario ossuaries, Uxbridge (Pfeiffer 1983) and Ossossane (Katzenberg and White 1979); that is, high infant and early childhood mortality, low mid-childhood to adolescent mortality, and a second peak in early adulthood, followed by another decline past 40 years. More specific comparisons are not feasible because of the impossibility of deriving a meaningful life table, and hence mortality rates, from the Ripley skeletal series.

POPULATION SIZE AND LENGTH OF OCCUPATION

In the absence of substantial numbers of recovered post molds as evidence for house sizes or numbers, the skeletal material may be used as direct evidence with which to predict population size at the Ripley Site. The basic model for determining prehistoric population size is one that takes into account the number of deaths, the length of time of cemetery use, and the annual rate of mortality (Howells 1960). All three of these factors, the number of deaths, years of occupation or utilization, and the mortality rate are inferentially derived. None is independently observable, and the estimates of the population size must therefore be viewed in the context of other variables such as site size and ethnohistoric information where available.

The number of deaths is obviously related to the number of skeletons. Two hundred thirty-eight to 282 individuals were discovered during the four excavations at the site; the larger number includes the 43 burials uncovered (and essentially unreported) by Conklin after 1962. The entire site has not been excavated; our best estimate is that about 30 percent remains unexcavated, and most of this area probably contains burials. If 238 burials represent 70 percent of the total, there should be 340 skeletons with the excavation of the entire site; if there were 282 skeletons, the hypothetical total would be 403. Clearly, we have no reason to suspect burial density to be the same in the unexcavated portions of the site, but there are other factors that might increase the number of potential skeletons. Subadult underrepresentation, for example, would predict more infants and children to have died at Ripley than have been found. A good example of this underrepresentation is provided by Christensen; he found only 4 infants, and 6 children altogether, of a total of 63 individuals. This proportion of subadults (9.5 percent) can be compared with a group of 23 skeletal series of pre- and protohistoric Indians reported by Jackes (1986). The proportion of skeletons from 0 to 5 years of age ranges from 7 percent to 56 percent, with a mean of 26 percent. For the 0-10 year category, the mean is 33 percent. The data in Tables 8.1 and 8.2 demonstrate that about 19 percent of the skeletons are in the "infant" or "child" categories (Table 8.1), or are less than 11 years of age (Table 8.2).

If Ripley mortality was similar to that observed in virtually all other prehistoric settings–and in most developing populations–we might expect another 15 to 20 subadults to be included in the combined skeletal series. The fact that infant and neonatal bones were recovered should caution us about overestimating the severity of the lack of subadult skeletons. Large pre- and protohistoric cemeteries have produced relatively small infant proportions (Jackes 1986:44), and low infant mortality (and low fertility) should be added to the cultural filters as causes of these low subadult frequencies.

MORTALITY AT THE RIPLEY SITE

Mortality rates, expressing the number of deaths per thousand, are normally derived from life tables, which in turn are constructed from the mortality experience of a population. The debate over the utility of paleodemographic approaches notwithstanding (Bocquet-Appel and Masset 1982; Buikstra and Konigsberg 1985; Peterson 1975; Weiss 1972), a life table was not constructed for the Ripley sample because of the limited number of individuals whose age at death could be determined with some confidence and our inability to determine the occupation length with greater precision. In the absence of mortality rates specific to the Ripley population, we must use those derived from larger samples. The range of mortality rates that should apply to a prehistoric agricultural population such as that at Ripley would be from 20 to 50 per thousand per annum. This range of mortality rates is similar to those reported by Bender (1979), based on a number of large North American prehistoric cemeteries. Mortality at the Uxbridge Ossuary (A.D. 1500), with a pattern similar to that at Ripley, has been estimated at 40 per 1,000 (Pfeiffer 1983).

The length of the prehistoric occupation of the site is a critical variable in predicting population size, and it is a variable that is dependent to a considerable degree on the population size itself. In general, we would expect an inverse relationship between length of site occupation and population size and density, due to the speed of resource depletion and waste accumulation. The relationship is best exemplified by data of monumentally exaggerated proportions. If Ripley had been occupied for only one year, and annual mortality was 4 percent, the predicted population would be 8,400. That population translates into one person for every 1.4 sq m, including the cemetery. If, on the other hand, the site was occupied continuously for the period suggested by the radiocarbon dates (Chapter 4), there would have been only 25 people living there. Implicit in these calculations is the assumption that Ripley represents a habitation area as well as a cemetery. If alternatively the Ripley Site was a specialized mortuary site, our concerns about population density are irrelevant. To reconstruct the population that used the mortuary site, we must assume that the population had no other burying grounds, and that the site was used only by the "target" population.

Since the site is small–between 1.2 and 2.0 ha–and since the site is also geologically delimited on at least three sides, a relatively small population is more likely. At the same time, it is necessary to avoid the imposition of our concepts of space and crowding on other cultures (Hodder 1986). In Table 8.3 a matrix of population sizes is presented in which population size is predicted from lengths of occupation and mortality rates. The use of a larger skeletal sample, reflecting the addition of the 43 skeletons reportedly discovered after 1962 by Conklin, would obviously increase all values within the matrix of the table. Given the lack of solid information about these 1963 burials, I will proceed without considering them further; the population estimates in Table 8.3 should be considered slightly conservative.

If we assume a somewhat high mortality rate, ranging from 30 to 40 per thousand, taking into account the evidence for interpersonal violence and childbirth mortality (discussed below), population sizes ranging from 567 to 756 are predicted with an occupational length of 15 years. A lower mortality rate predicts larger populations, and a shorter site occupation creates very large population estimates.

As a point of comparison, Sempowski, Saunders, and Cervone (1988) used a mortality rate of .04 and a 10-year site duration to estimate the population size of the Adams Site at 950 individuals. The same values result in a Ripley population of 850. The Roebuck Site, a prehistoric St. Lawrence Iroquois village occupying 3 ha, has an estimated population of 2,000 (Pendergast 1983:49). Equivalent population sizes are claimed for the larger Neutral, Huron, and New York Iroquois historic villages (Heidenreich 1971; Trigger 1976, cited in Pendergast 1983). A similar population density at Ripley would translate into a population of 800 to 1,350 with site sizes of 1.2 and 2.0 ha.

The date of the utilization of these sites is a critical variable, as the early seventeenth-century Iroquois sites experienced increased population due to nucleation (Snow and Starna 1989:145), followed by rapid depopulation due to epidemic diseases. In 1634, eight identified Mohawk villages (including "castles") ranged in size from 360 to 3,300 people (Snow and Starna 1989:145), and these population sizes postdate the village fusions of the previous century. Snow and Starna (1989:147) have placed the nucleation of Mohawk population at about 1550, which corresponds to the presumed time of Ripley's occupation.

A longer utilization–and smaller population–is probable for Ripley, and there are some tangential data which support this contention. The reuse of at least one grave discovered by Christensen suggests that the earlier grave was forgotten by a later generation. Also, the evidence for infectious diseases, often associated with dense settlement patterns, is notably missing from the Ripley skeletons. Further, no extensive midden deposits have been described from the site, and what little evidence that exists relevant to post molds and structures suggests that numerous or large longhouses were not built at Ripley. I take the lack of evidence for subsistence and shelter as suggestive of a small population if the

TABLE 8.3. POPULATION ESTIMATES BASED ON 340 SKELETONS.

	Years of Occupation				
Mortality Rates	7	10	15	25	50
20/1,000	2,429	1,700	1,133	680	340
30/1,000	1,619	1,137	756	453	227
40/1,000	1,214	850	567	340	170
50/1,000	971	680	453	272	136

site was a village. If it was strictly a mortuary area, the supporting population would also be small if the span of site utilization was long (as indicated by the radiocarbon dates). As noted above, references abound in support of Iroquoian villages with 2,000 inhabitants; in support of the small population model, there are also Jesuit accounts of Neutral villages, 10 of which had an average population of 300. The Neutral villages were also occupied considerably longer than were the more frequently cited Huron villages (Thwaites 1896-1901:21:223, cited in Jackes 1986:40).

To reiterate, there are several aspects of the site that are consonant with the mortuary-site concept: the lack of a clear demarcation between "village" and "cemetery," the lack of a large midden area, the lack of clear evidence for habitation structures or longhouses, the presence of an earthen circle, and the small size of the site.

INTERPRETATION OF HEALTH STATUS

The overall impression of the population represented by the skeletal material from the Ripley Site is that its members were relatively disease-free, but died rather young, and that mortality experience may have been sex-specific. The general health and nutritional status of the prehistoric population were assessed by gross observations of chronic stress indicators: enamel hypoplasia, porotic hyperostosis, and generalized periostitis. These three markers provide us with indications of the general prevalence of non-specific stressors such as mal- or undernutrition, infectious diseases, and, in the case of porotic hyperostosis, iron deficiency anemia and/or parasitic diseases.

Enamel hypoplasia consists of one or more transverse lines or pits in the enamel surface, this hypoplasia being caused by growth arrest during the process of enamel production (Messer 1985; Schafer et al. 1983). Hypoplasia is commonly viewed as an indicator of growth arrest resulting from poor nutrition, infectious or parasitic diseases, or a combination of these stressors (Blakey and Armelagos 1985; Corruccini et al. 1985; Goodman et al. 1987). In the Ripley samples, there are 45 observable anterior dentitions (hypoplasia was scored only on central maxillary incisors and mandibular canines). Of these, 30 or 67 percent have some hypoplasia, while about 25 percent have medium to marked cases. By comparison, the same condition was present on 81 percent of a small sample of Late Woodland dentitions from eastern New York (Menands Bridge), representing a group of semi-sedentary hunter-gatherers. A large Late Woodland site in Michigan (Riviere aux Vase) yielded a skeletal sample with a hypoplasia frequency of 78 percent. Patterson (1986) has reported frequencies of canine hypoplasia in the Kleinburg Ossuary (A.D. 1600) as 51 percent, and 76 percent at the Late Woodland Bennett Site. The frequency of hypoplasia and its relatively low severity among the Ripley population indicate a moderate level of stress. The etiology of enamel hypoplasia is non-specific; we suspect a disease/nutrition link, but genetic factors cannot be ruled out.

Porotic hyperostosis, manifested as cribra orbitalia and/or porosis and related bony reaction in the cranial vault (Mensforth et al. 1975), was observed on 6 individuals: an 18-month old, a 4-year-old, and 4 young adult females. The young and reproductive-age women are the primary targets for iron deficiency anemia, so the pattern of occurrence is typical, if low in frequency. The number of observable crania was 48, so the frequency is 12.5 percent. A comparative frequency for the Late Woodland Menands Bridge Site is 44 percent, with all occurrences being among subadults and females. Ripley has, then, the same pattern of anemia, but in lower frequency than the earlier, presumably less agricultural population.

The frequency of individuals affected by non-specific infections, as indicated by periosteal reactions on femora, tibiae and fibulae, is between 2 and 30 percent, depending on the bone being analyzed. The tibia is the most common site for periostitis, and it has the higher frequency in the Ripley sample as well. A frequency of 30 percent is not particularly high, when one includes slight and healed cases, as I have. By comparison, the Menands Bridge sample has a frequency of 90 percent, and a contemporary Late Woodland population from Michigan (Riviere aux Vase) has a frequency of 56 percent. Once again, the Ripley sample is quite healthy by comparison with earlier populations in the greater Northeast. None of the Ripley individuals manifests the extreme periostitis observable in these two comparative samples, indicating the better health status of the Ripley population in terms of both severity and frequency of infectious diseases.

Dental diseases, while not classic stress symptoms, do indicate a dietary reliance upon carbohydrate or sugar-rich foods and a general lack of oral health, at least. Caries were very prevalent in the Ripley population, in terms of those observable and those inferred. Of 49 individuals represented by maxillae or mandibles, only three were caries-free and had suffered no pre-mortem tooth loss. Tooth loss before death is most likely evidence for dental and/or periodontal disease and contributes to the 94 percent dental disease frequency in the sample.

One of the more interesting aspects of general health and well-being in the Ripley sample involves traumatic injury and death. Such injuries are clear indicators of stress on a population, whether these injuries are the result of interpersonal violence or more "natural" causes, such as accidents and childbirth. There are eight individuals in the sample with evidence of trauma, five having died as a result. Two females were found with term fetuses in their pelvic areas, and childbirth death seems likely. Three other women had cranial injuries; one depressed fracture, and two wounded by sharp objects. Once again, interpretation is frustrated by the small sample, but the inclusion of females among the injured is fairly common in prehistoric and protohistoric mortuary samples, although "equality" in victimization is not. The presence of violence against both sexes suggests raiding parties (Milner and Smith 1990), and the type and severity of injuries to women is similar to that described for Riviere aux Vase (Wilkinson and Van Wagenen 1993).

One of the latter was described by Audrey Sublett (n.d.) as a trephination, implying intentional cranial surgery. The injury does look very much like a surgical procedure, especially the leaf-shaped opening in the skull. Two factors, however, argue against this being a surgical procedure. First, there is no evidence of periosteal reaction around the opening, which usually appears after the scalp has been reflected prior to the bone incision. A second factor is the rarity of the operation. While many prehistoric and non-Western populations have engaged in cranial surgery in the past, and do so today, discovering only one example requires extreme caution in attributing the cranial opening to surgery. Put simply, neurosurgery is not something that a culture invents or reinvents on rare occasions as therapy. If there was surgical intervention here, it would more likely have been in the form of post-trauma cleaning and removal of bone splinters. I interpret this skull opening, then, as evidence for interpersonal violence, and not surgery, per se.

A comparison of the incidence of degenerative joint disease (DJD) between the sexes illustrates another substantial difference. Once again the differences are not statistically significant because of the small sample sizes, but the direction and magnitude of the differences require our attention, at the least. The data are presented in Table 8.4, and they clearly show that females have higher incidences of DJD in all regions but the hip. Since there is no significant difference in the ages at death between the sexes, age alone cannot account for the observed differences. In fact, the small number of males in the sample is due to the absence of young adult males from the mortuary sample. Their inclusion would most likely increase the difference in DJD frequencies, as they would be an unlikely cohort to have high frequencies. The transition to and intensification of agriculture has been seen as responsible for sex-specific, activity-induced stress (Bridges 1989), and the same basic etiology is most likely at work here as well. That is, females took on the primary responsibility for agricultural tasks, in addition to other load-bearing activities (child, food, possessions transport). The increased activity, acting on a smaller skeletal system, results in differential stress on affected joints. Both sexes have relatively high frequencies of DJD in the cervical vertebrae ("neck" in Table 8.4), suggesting that both sexes utilized the head and neck in carrying objects. The vertebrae similarity ends at the neck, however, as only females continue a high frequency of arthritic changes in the lower back. Such differences, in turn, are possibly indicative of differences in flexion and extension of the lumbar region. Agricultural activities immediately come to mind.

Identifiable traumatic injury among the males was of two types: fractures from a fall, and fatal arrow wounds. The fractures occurred to a 23-year-old, who had compression fractures of three lumbar vertebrae and a detached vertebral arch. Two other males were shot with arrows, and a third was probably killed in this manner. The first two had projectile points imbedded in their vertebrae, while the third is described by Christensen as having two projectile points in or near the internal surface of the os coxae in such a way as to convince him that the person had been shot.

The overall health picture at Ripley, at least on gross examination, is one of moderate disease and nutritional stress, frequent dental disease, and fairly high incidence of traumatic injury. The Ripley population seems to have avoided the chronic disease–malnutrition spiral common to many prehistoric populations, especially agricultural ones. Mortality in this group seems to have come instead from the more acute stresses of childbirth and warfare. The Ripley skeletal sample, then, presents us with the not-infrequent picture of a "healthy" population suffering from relatively high young adult mortality.

We must avoid the temptation to overinterpret the mortality pattern suggested by the Ripley skeletal data. The apparent high incidence of young adult mortality also might be indicative of trauma normally associated with that cohort, for example. Further, the mortality pattern does not provide a

TABLE 8.4. DEGENERATIVE JOINT DISEASE DISTRIBUTED BY SEX AND REGION.

	Males		Females		Total	
Region	n	%	n	%	n	%
TMJ*	8	12.5	14	14.3	22	13.6
Neck	7	28.6	11	36.4	31.6	19.0
Shoulder	12	0.0	23	13.0	35	8.6
Elbow	14	14.3	23	26.0	37	21.6
Wrist	12	8.3	19	15.8	31	12.9
Lumbar	8	0.0	11	36.4	19	21.1
Sacroiliac	7	0.0	5	20.0	12	8.3
Hip	13	23.0	23	17.4	36	19.4
Knee	14	14.3	24	25.0	38	21.1
Ankle	7	0.0	12	25.0	19	15.8

*TMJ: Temporomandibular joint

basis for epidemic diseases, since we expect increases in mortality among the very young and very old, and not late adolescents and early adults (Jackes 1986). Epidemics also seem unlikely given the positive evidence for other causes of death and the homogeneity of mortuary practices. Epidemic diseases affect the social fabric as well as the biological, and disruption of the normal burial ceremonialism would be expected in epidemics. Finally, the seeming good health of the Ripley population may well be another example of the "osteological paradox" of Wood and colleagues (1992). The paradox relates to "healthy" people who died at early ages. The absence of disease markers can be a measure of acute illness with no subsequent recovery, and the population can be interpreted as vulnerable, not healthy.

SUMMARY

The extant skeletal material from the Ripley Site represents a heavily filtered sample of a substantially large and important protohistoric mortuary population. The belief systems of the represented cultural group, the post-depositional, natural forces of disintegration, and the methodologies of archaeologists and curators have combined to reduce the sample dramatically. Nevertheless, this rather typical museum collection provides us with data independent of the technological or settlement spheres for the assessment of population size, sex- and age-specific mortality patterns, sexual division of labor, and general environmental adaptation, as indicated by measures of health and nutrition.

The skeletal evidence from the Ripley Site suggests a small, long-term population. In the absence of evidence for a substantial village occupation at the site, Ripley might well be considered to be a mortuary site, serving one or more (unknown) villages in the area. The population interring its dead at the Ripley Site was paradoxically healthy and short-lived, where health is measured by infrequency of chronic diseases and/or malnutrition. Epidemic diseases do not fit the mortuary evidence, but traumatic injury is likely to be responsible for the high levels of young adult female mortality. Sex-specific differences in physical stress were demonstrated by comparing frequencies of degenerative joint diseases, the differences being interpreted as evidence for greater stress among the females. A combination of positive evidence for traumatic injury and death among young adult males and negative evidence in the form of the relative lack of these males in the mortality sample leads to the interpretation of interpersonal violence among males at some distance from the site.

A portion of the skeletal material from the Ripley Site was analyzed nearly 20 years ago by Audrey Sublett (1966). Using approaches typical of the time, she noted morphological similarities between her Ripley sample and others to the east. She also noted some clinical aspects of paleopathology, in the form of caries and a putative trephination scar. The present study focuses on populational phenomena and takes a more bioculturally interactive approach. The different approaches and consequent results point to the value of maintaining prehistoric skeletal material for restudy and of the importance of museum collections to future research in anthropology.

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CHAPTER 9

MORTUARY CUSTOMS AND SOCIETY

Lynne P. Sullivan and Gwenyth Ann D. Coffin

The over 200 burials excavated from the Ripley Site since the turn of the century offer an excellent opportunity to study the social dimensions of Ripley Site mortuary practices and, through these customs, to infer principles of the sociopolitical organization of the former inhabitants. The resulting information is important for understanding not only the Ripley Site but also broader problems of regional sociopolitical variability and integration.

The research presented here has five goals in this regard:

1. to describe mortuary practices at the Ripley Site
2. to infer from differential burial treatment the range of social status distinctions present in Ripley society
3. to decipher the spatial plan (if any) of burial placements at the Ripley Site
4. to infer the overall sociopolitical structure of the society
5. to compare these data with those from a nearby archaeologically represented population, the sixteenth-century Seneca.

THEORETICAL CONSIDERATIONS OF ANALYSES OF MORTUARY PRACTICES

O'Shea (1984) has presented an overview and critique of current thought about the linkage between archaeologically observed mortuary data and the organizing principles of the responsible society. The basic tenet of such inquiries is the systematic relationship between a society's treatment of its members in life and subsequent treatment at death. Primary social distinctions based on age and sex can be observed through cross-tabulations of various aspects of archaeologically observed mortuary practices with these biological categories (O'Shea 1984:42). Three broader categories of social differentiation may also be discernible in analyses of archaeological data: vertical and horizontal dimensions (O'Shea 1984:16; Tainter 1977:331) and special statuses (O'Shea 1984:49, 64).

"Vertical differentiation" refers to the structure of hierarchical rank grading in a society, such as distinctions between chiefs and non-chiefs. Brown (1981) summarized archaeological approaches for detecting vertical differentiation or ranking in mortuary data, especially focusing on discerning the presence of ascribed (inherited) vs. achieved status. He discussed three arguments for assessing such differentiation: (1) the effort-expenditure principle, (2) symbols of authority, and (3) demographic structure of the population (Brown 1981:29-30).

The effort-expenditure principle is based on the argument that the higher an individual's rank, the larger the amount of energy invested in the mortuary ritual. Although valid as a guiding tenet for assessment of mortuary practices, in practice this principle is often difficult to apply because of the inability to accurately assess the relative expenditure expressed in different materials or treatments. For example, does a well-made bone tool represent more energy investment than a stone tool or pot?

Symbols of authority, which may include items such as special headdresses or ornaments, have been proposed by Peebles and Kus (1977) as evidence of inherited status when such symbols occur within a small population segment that cross-cuts distinctions based on age, sex, and personal achievement. Although the type of inherited status must be interpreted with caution, the presence of symbols of authority with infant as well as adult graves is strong evidence for inherited status (Brown 1981:30). Problems arise when such symbols are not easily recognized.

Inherited status may also be observed in a mortuary population's demographic structure when two or more disproportionate segments of the population can be recognized. A ruling elite should form a distinct minority of the population, yet should include all age classes and both sexes (Brown 1981:30).

"Horizontal differentiation" refers to separate, but generally equivalent, groupings such as clans or sodalities and task groups. Such differentiation typically is less readily observed in archaeological circumstances than is vertical differentiation (O'Shea

1981, 1984). Horizontal differentiation may be reflected in the division of the population into equal segments of normal demographic composition through distinctions of essentially equal value or investment, such as grave orientation, body posture, or spatial separation (O'Shea 1984:46-47, 252-254). Detection of contrasting sets of symbols is critical for recognizing such differentiation and thus is highly dependent on equitable preservation and recovery of such information for all groups. Since this evidence also tends to be common and non-exclusive, several lines of corroborating evidence must be discerned. For example, occurrence of multiple grave orientations alone is insufficient evidence for interpretation of horizontal differentiation.

"Special statuses" encompass a wide range of social positions that may perform special tasks on limited occasions, such as the bison hunt "police" of several Great Plains societies (O'Shea 1984:71-86), or may reflect social deviancy. Special statuses may also be accorded in a mortuary context due to the circumstances surrounding a death (O'Shea 1984:85). Special statuses usually are recognized by their infrequent occurrence, non-normative behavior, and generally low level of effort expenditure (O'Shea 1984:254). Difficulties arise in discerning such special statuses from wholly idiosyncratic behavior and in interpreting the meaning of the distinctions (O'Shea 1984:254).

Interpretation of these various classes of social differentiation, once recognized, is dependent upon comparison with ethnographically derived models of social distinctions.

IROQUOIAN SOCIAL ORGANIZATION

Late prehistoric and protohistoric societies in the southeastern Lake Erie Basin are loosely characterized as tribal societies, comparable to the type of sociopolitical organization recorded for historically known Iroquoian groups (Trigger 1981). Each Iroquoian tribe was composed of two or more settlements. In some areas several tribes linked together to form a confederacy. A well-known example is the League of the Iroquois.

Traditional Iroquoian societies have marked horizontal differentiation in the form of matrilineal clans, which are grouped into moieties. Other types of horizontal differentiation that cross-cut clan lines are various religious or medicine societies, war parties, and mutual aid societies or task groups. Leadership in the medicine societies is open to individuals of either sex, and these individuals are responsible for keeping the songs and rituals. Other society members include persons who join because of special dreams or because they were cured by society ritual. War parties traditionally were exclusive to males but were otherwise fortuitous in composition except for locality. Seasoned warriors usually provided leadership for the war parties. In the past, mutual aid societies were especially important mechanisms for women to organize horticultural work groups (Fenton 1978:309-316; Quain 1961:266).

Within each matrilineal clan are a number of vertically differentiated positions that are inherited through certain lineages. The most powerful of these positions are the chiefs. Holders of these titles are men who made up the leadership of the clan, village, tribal, and/or confederacy councils. The traditional pattern is for boys to inherit the titles held by their uncles, but the clan women (usually senior matriarchs referred to as "clan mothers") hand-pick the individuals to hold the titles. There is thus no strict adherence to primogeniture as a method for receiving a title, and there are many recorded cases of titles passing to different lineages because of a lack of acceptable candidates (cf. Fenton 1951:48). Women's counsel or advice is highly regarded, and it is possible for women to gain political prestige but not to hold the hereditary titles. Honorary chiefly titles (known as "pine tree chiefs") are conferred on individuals of both sexes who are respected for their counseling ability but are not eligible to hold the inherited titles (Fenton 1978:314-315; Quain 1961).

Other avenues are available for individuals to attain high social and political rank through personal achievement. In the past, skill in warfare was a very important means for Iroquoian males, especially young men, to gain prestige. Trading ability was another way (undoubtedly enhanced by European contact) to gain social prestige in many Iroquoian societies. Outstanding expertise in womanly work, such as aspects of horticulture and certain crafts, were means by which a female could better her social standing (Fenton 1978:300, 315-316; Quain 1961:275).

Age-grading also is important in Iroquoian societies. According to Fenton (1978:314), "the Iroquois revere the dead and include them as the highest grade; the next grade is the Elders, the 'Old Men' and the 'Old Ladies'; they next speak of 'young people'; they always include children, 'those still on the boards' or 'crawling on the ground'; and the Unborn 'whose faces are turned this way from beneath the ground' complete the cycle." Babies are considered to be "barely separated from the spirit world" (Fenton 1978:314).

Given this very generalized description of the organization of Iroquoian societies, several predictions can be made about the mortuary practices observed at the Ripley Site, if the organization of this society fits a general Iroquoian model. Two basic tiers of ranking or vertical differentiation should be observable. Individuals in the higher ranking tier would include the chiefs, leaders of various societies, and persons who gained prestige through individual achievements. Since personal ability, achievement, and age were instrumental in attaining all high-ranking positions, even in the case of chiefs, the demographic profile of this upper tier would be heavily dominated by adults.

There is no ethnographic evidence to indicate that deceased Iroquoian chiefs were venerated (Trigger 1981:26), but it is likely that the chiefs were afforded somewhat different mortuary treatment than other individuals. Such differential treatment may have been expressed by symbols of authority, spatial segregation or other differential disposition, or by elaborations in funerary objects. In any case, chiefly positions would most likely be represented by a small number of adult, probably older, men. Similarly, the most politically influential women, the clan mothers, should be represented by a small number of older women who received differential treatment.

Other individuals comprising the upper tier may best be identified by comparison with individuals of the lower ranking tier, since the remainder of the upper tier would include a wide variety of specialized positions represented by only a few individuals. The one exception to this pattern would be males who gained prestige through warfare. This group should include a relatively large number of individuals, possibly with redundancy in treatment. Since skill in warfare often laid a foundation for other types of prestige later in life, it is also possible that an additive effect may characterize male mortuary symbolism. That is, an older male may receive mortuary treatment indicative of his prowess as a young warrior as well as his leadership skills in later years. Such cumulative treatment would not influence female mortuary treatments. Instead, to receive mortuary treatments that essentially signify two different positions of prestige, a female would need to simultaneously be recognized in two different roles. For example, a woman would have to be both an outstanding potter and a clan mother. Such female roles do not represent the usual life transition as does the male warrior to respected elder progression.

The markedly different social patterns for the sexes in Iroquoian societies should be reflected in the mortuary practices. After the age of eight or nine, boys and girls were brought up very differently, and these patterns continued for life, with the result that "Iroquoian men and women had separate and different culture patterns, different values and different life goals" (Randle 1951:174). In general, boys were less tied to the kinship groups and participated in more fortuitously composed male groups. Such groups, including war parties, became the focus of male activities. In contrast, females were more tied to their kin groups and were responsible for most of the functions that served to hold the clan together, such as naming of the chiefs and organizing various ceremonies and feasts. The matrilocal residence pattern of the Iroquois undoubtedly was a factor in shaping these different social patterns for the sexes.

Horizontal differentiation is extremely important in structuring Iroquoian society. Ethnohistoric literature suggests that clan symbols were placed over the doors of Iroquoian houses to indicate the affiliation of the residents (Quain 1961:256). Since the clans were the most politically powerful and pervasive horizontal divisions in Iroquoian society, it is likely that clan symbolism was used in mortuary ritual as well. If mortuary treatments were found to define population segments with normal demographic profiles, clan symbolization could be inferred. It is unlikely that members of other horizontally differentiated groups, such as the medicine societies, could be recognized, given the small number of individuals associated with such groups. Due to the shortfalls of the Ripley Site data, uneven recovery of markers signifying horizontal divisions may also mask their recognition.

THE DATABASE

As described in Chapter 4, excavations by Harrington in 1904, Parker (1907) in 1906, Christensen in the 1950s, and Conklin in the 1960s resulted in collection of data of varying quantity and quality on some 238 individuals from 178 burial features. These figures exclude the burials from the post-1962 Conklin excavations for which little information exists. Archaeological observations of mortuary ritual occur in six broad categories: (1) biological; (2) body preparation and disposition; (3) mortuary facility; (4) grave furnishings and/or funerary objects; (5) locational aspects of the cemetery, the individual facility, and within facility arrangements; and (6) environmental conditions, such as indicators of season of burial (O'Shea 1984:39-41). The Ripley Site data set includes information to some extent for all of these categories, but the information on funerary objects is the most consistently recorded and complete.

For the purposes of this analysis, available information for each individual was coded according to a standardized format (Appendix C). In cases where information was missing for a particular variable, that category was coded as indeterminate, and the individual was excluded from computations involving that variable. Only funerary objects in clear association with an individual were considered. In the few cases of multiple burials where it was not possible to assign funerary objects to a specific individual, the items were excluded from the analysis. Fetal individuals were also excluded from the analysis. Objects referred to by the excavators as being in "grave dirt" or "grave fill" were excluded from consideration, since we assume these items to have been accidental inclusions in the mortuary context and thus of no cultural significance (O'Shea 1984:24).

Problems with correlating individual osteological remains in the various collections with specific proveniences have been discussed by Wilkinson in Chapter 8. Due to these problems, the excavators' age and sex determinations had to be relied upon for many of the skeletons in this analysis, although Wilkinson's age and sex assessments were used whenever possible. The age groupings used for this analysis are listed in Appendix C. Since the excavators did not consistently use the terms "infant" and "child" to refer to distinct age groupings, individuals described with only these broad terms were classified as indeterminate subadults. If an age assessment in years was provided, the individual was assigned to the appropriate age category. Parker was occasionally inconsistent in his sex attributions. In a few cases, the same individual has differing sex designations in the text and summary table in his report (Parker 1907) and in his field notes. In these cases, the individual was assigned the sex that was listed in two of these three references.

Unfortunately, these problems with the data are a clear reminder of the need for informed excavation and responsible curation. Fortunately for this analysis, the relatively obvious sexual dimorphism in the population facilitated the accurate assessments of a skeletons' sex by the excavators (Wilkinson, this volume). We also can assume that distinctions between subadults and adults are accurate on a gross level, but with the exception of the Harrington collections, more precise age assessments must be viewed with skepticism. If more precise information were available, the interpretations presented here could, of course, be enhanced.

Another category of problems with the Ripley Site data is the present lack of understanding of the length of occupancy of the site. The radiocarbon dates obtained from the 1988 excavations in combination with the occurrence of European trade items suggests either that the site was used over a long period of time, perhaps two centuries, or that there are multiple components. In either case, considerable time depth is not an unusual characteristic of mortuary samples. In normal cases, several generations are needed to produce a sample of sufficient size to analyze mortuary practices. The possibility that social changes occurred during this passage of time cannot be ignored. O'Shea has suggested that in situations where fine-grained chronological control is unavailable, systematic bias resulting from temporal change may cause

> a spuriously large number of categories of funerary differentiation, or even in the appearance of parallel sets of funerary distinctions. In most cases, however, it will simply increase the level of 'noise' against which the behavioral patterns must compete for recognition [O'Shea 1984:30].

Especially given that use of the Ripley Site extended into the Contact Period, the results of the mortuary analysis must be evaluated with the possibility of cultural change in mind. It is possible that those burials associated with funerary objects of European origin may shed light on such processes.

BURIAL POSITIONING ANALYSIS

The most usual form of interment at the Ripley Site is a single individual placed in a flexed position in an simple pit. Eighty-three percent of the graves conform to this description. Variations from this pattern include 27 occurrences of multiple burials (more than one individual in a grave), two possible bundle burials, and four possible extended individuals (Table 9.1). Twenty-one of the multiple burials included two individuals, five included three skeletons, and one contained four individuals. No general pattern of positioning on the right or left side is indicated for the flexed burials (Table 9.2). A few individuals were placed facing up or down. Positioning on the right or left side is not related to age or sex (Table 9.2). Several investigators mentioned the presence of burned areas or "grave fires" located at the top of the fill of some pits (e.g., Figure 4.8). These features are not systematically recorded and thus cannot be analyzed for association with a particular type of individual or facility. Mention is also often made of a layer of carbonized material being found either "lining" the bottom of graves or in a layer over the grave. Occurrence of such layers could not be correlated with age or sex of the interred individual.

Orientation of the graves (i.e., the direction in

TABLE 9.1. OCCURRENCES OF MULTIPLE BURIALS.

Collection									
Harrington		Parker		Christensen		Conklin		Total*	
n	%	n	%	n	%	n	%	n	%
5	16.0	13	13.5	7	13.0	2	10.5	27	1.04

*n = 188

TABLE 9.2. BURIAL POSITIONING ON SIDES AND RELATIONSHIP TO AGE AND SEX.

	Age				Sex					
	Subadult		Adult		Male		Female		Total	
	n	%	n	%	n	%	n	%	n	%
Right	10	36.0	57	54.0	24	57.0	26	51.0	87	52.0
Left	18	64.0	48	46.0	18	43.0	25	49.0	81	48.0

which the head was pointing) is not random. An overall preference for heads to the east is indicated by Figure 9.1. Second most common orientations are to the southeast and south. Some differences in the modal orientations recorded by the various excavators are also portrayed in Figure 9.1. The most common orientation observed by Harrington is to the east, while Conklin recorded the orientation of the majority of individuals he excavated as being to the southeast. Due to the imprecision in measurement by all of the investigators, it is not possible to discern if these differences are substantive. Orientation is clearly not related to age (Figure 9.2), but there is a tendency for females more consistently to be oriented to the east, while orientations of males were more erratic (Figure 9.3). This tendency is not statistically significant ($x^2 = 1.0498$ @ .3055 sign.).

The overall impression of mortuary practices at the Ripley Site based on burial positioning is one of general uniformity, with no readily discernible variation related to social factors. Neither gender nor age appears to have influenced the positioning of the interred body. Whether orientations are related to astronomical factors, such as solstices,

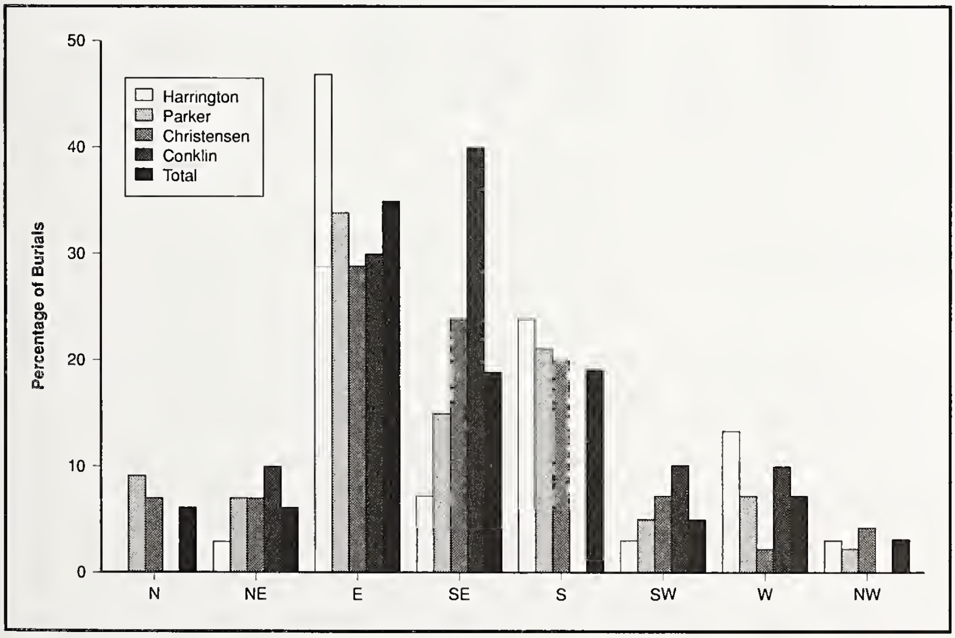


Figure 9.1 Burial orientations by collection.

Figure 9.2 Burial orientations by age.

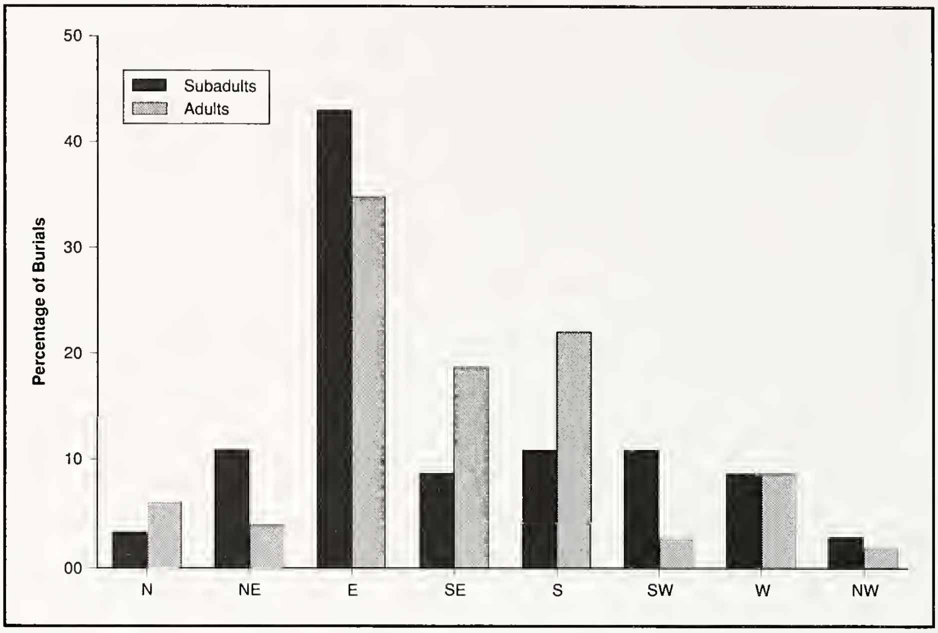
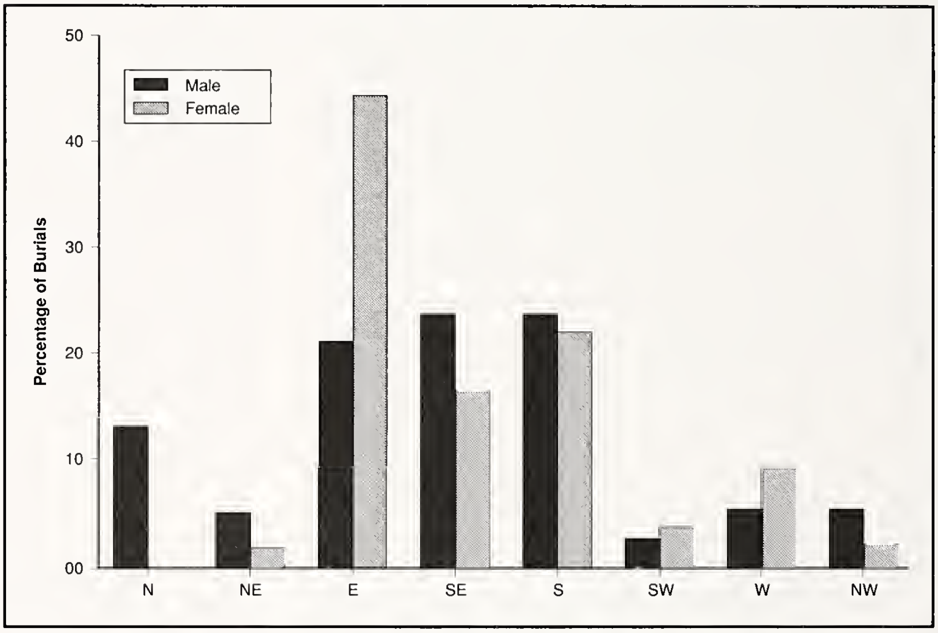


Figure 9.3 Burial orientations by sex.



cannot be evaluated due to the lack of precision in the recorded orientations.

ARTIFACT ASSOCIATION ANALYSIS

Seventy-two percent of the individuals were interred with some form of funerary object or grave offering. The most frequent types of funerary objects are pottery vessels, interred with 132 (56 percent) individuals; small triangular projectile points, associated with 34 (14 percent) individuals (in three cases, these apparently were inflicted); and red ocher, found with 29 (12 percent) individuals. Funerary objects were most frequently placed near the head (39 percent). Placement of several kinds of objects in different positions is the next most common (16 percent) practice. Categories of objects more frequently placed in positions other than near the head are shell and glass beads, shell gorgets, copper (or brass)[3] objects, and botanical materials. The beads, copper items, and gorgets occur either on the arms or in the neck area, undoubtedly indicating their use as ornaments. Botanical materials were most frequently placed inside pots. Animal refuse

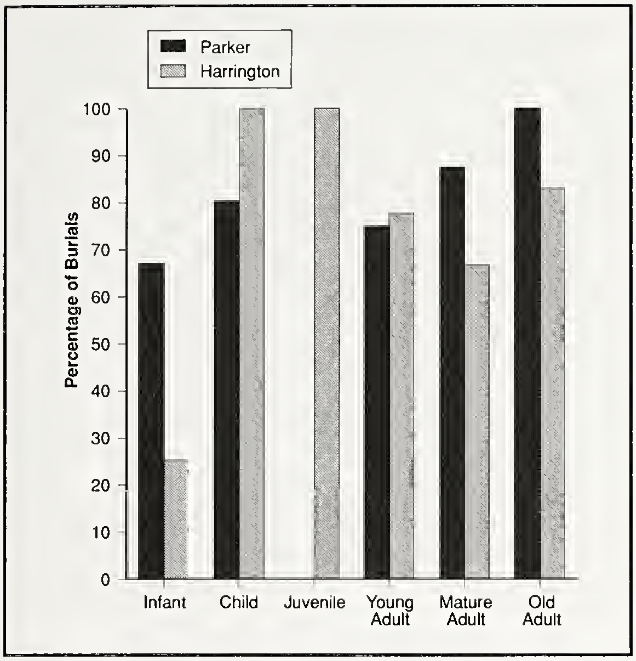


Figure 9.4 Distribution of funerary objects by age in the Parker and Harrington collections, showing percentages of burials with objects for each age group.

bones also commonly occur in pots but were most frequently placed near the head.

Age Associations

A significant relationship exists between age and likelihood of being interred with funerary objects (Table 9.3). In general, adults more often received funerary objects than did subadults. This distinction is a result of fewer occurrences of younger children (≤10 years) being interred with objects than other age categories (discounting fetuses). Interestingly, the two collections for which there are the most age estimates for individual skeletons (i.e., Harrington [n=35] and Parker [n=26]) portray differing patterns of frequencies of funerary-object associations when more specific age categories are examined (Figure 9.4). The Parker data indicate an increase in likelihood of receiving funerary objects as age increases, while the Harrington data suggest older children (ages 11 to 15 years) and juveniles (ages 16 to 20 years) were more frequently interred with objects than were adults. Small sample sizes and the problem of reliability of Parker's age estimations make the significance of these observed patterns difficult to assess. Temporal factors and/or intrasite differences are also potential factors in these differing distributions.

Distinctions also exist in the kinds of funerary objects associated with age groups. The clearest differentiation is again between adults and subadults. Certain types of funerary objects are either exclusively associated with adults or tend at a statistically significant level to be associated with adults (Table 9.4). Perusal of the composition of the age and non-age-related funerary-object categories suggests general distinctions in the symbolization of activities deemed appropriate for adults rather than children. Artifacts typically assumed to be tools or weapons (e.g., projectile points and other chipped stone tools, ground stone tools, bone awls, and metal blades or chisels) or debris associated with tool or weapon manufacture (e.g., debitage) generally are restricted to adults. The only exceptions are one occurrence each of a beaver incisor and a pestle with subadults. The two occurrences of glass trade beads are restricted to adults, but both children and adults were interred with shell and bone beads. Copper ornaments are associated with both children and adults, but the only type of copper ornament associated with a subadult is a bead. Copper rings and bracelets are associated with adults. Three types of artifacts which could be considered "ceremonial" (e.g., minerals other than red ocher, including graphite and an unidentified purple pigment; cut bear maxilla; and possible turtle shell rattles) are exclusively restricted to adults. Two other artifact

TABLE 9.3. RELATIONSHIP BETWEEN AGE AND OCCURRENCE OF FUNERARY OBJECTS.

	Age					
	Subadult		Adult		Total	
Funerary Objects	n	%	n	%	n	%
Present	26	58.0	91	78.0	117	72.0
Absent	19	42.0	26	22.0	45	28.0

X^2 = 5.52142 at significance of .0188

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[3] Chemical testing to determine whether such objects were made of native copper or European copper or brass was not undertaken in the context of this study. Fitzgerald and Ramsden (1988) have conducted some work on this problem and determined that copper as well as brass objects are present at the Ripley Site.

types in this category (i.e., pipes and red ocher) are associated with both adults and children, but red ocher tends to occur at a statistically significant level with adults, and from a total of 12 individuals with pipes, there is only one occurrence with a subadult. Two categories of objects possibly associated with food (i.e., pots and botanical remains) are not age-related, while animal refuse bone is associated exclusively with adults.

Assuming that funerary objects reflect aspects of an individual's role in society, possible implications of these distinctions are that the tools and weapons interred with adults symbolize craft, subsistence, and defensive activities performed by adults; that adult status was associated with wearing of certain ornaments; and that particular ceremonial activities were reserved for adults. Conversely, and perhaps obviously, certain food stuffs were not restricted to

TABLE 9.4. AGE ASSOCIATIONS OF FUNERARY OBJECTS.

Object(s)	Subadult		Adult		X^2 significance	Association
	n	%	n	%		
Pot	21	43.0	65	56.0	.1858	none
Projectile Point	0	0.0	23	20.0	.0020	adult
Pipe	1	2.0	11	9.0	*	adult
Debitage	0	0.0	11	9.0	*	adult
Ground Stone	1	2.0	14	12.0	*	adult
Chipped Stone	0	0.0	17	15.0	.0112	adult
Ocher	2	4.0	19	16.0	.0583	adult
Mineral	0	0.0	5	4.0	*	adult
Glass Beads	0	0.0	2	2.0	*	adult
Copper Ornament	2	4.0	5	4.0	*	none
Botanical	2	4.0	8	7.0	*	none
Cut Bear Maxilla	0	0.0	4	3.0	*	adult
Turtle Shell	0	0.0	2	2.0	*	adult
Beaver Incisor	1	2.0	4	3.0	*	none
Awl	0	0.0	9	8.0	*	adult
Bone Refuse	0	0.0	10	9.0	*	adult
Shell Bead	5	10.0	7	6.0	*	none
Metal Tool/Weapon	0	0.0	6	5.0	*	adult

* Insufficient sample for statistical relevance. Items were judged as being age associated if there were at least two occurrences and all were associated with one age group. If there were ten or more occurrences, one anomaly was allowed.

TABLE 9.5. SEX ASSOCIATIONS OF FUNERARY OBJECTS.

Object(s)	Male		Female		X^2 significance	Association
	n	%	n	%		
Pot	27	59.0	32	55.0	.8721	none
Projectile Point	18	39.0	3	5.0	.0001	male
Pipe	9	20.0	1	2.0	*	male
Debitage	9	20.0	2	3.0	*	none
Ground Stone	9	20.0	3	5.0	.0485	male
Chipped Stone	9	20.0	3	5.0	.0485	male
Ocher	9	20.0	10	17.0	.9608	none
Mineral	4	9.0	1	2.0	*	none
Glass Beads	1	2.0	1	2.0	*	none
Copper Ornament	0	0.0	4	7.0	*	female
Botanical	6	13.0	2	3.0	*	none
Cut Bear Maxilla	3	7.0	0	0.0	*	male
Turtle Shell	2	4.0	0	0.0	*	male
Beaver Incisor	4	9.0	0	0.0	*	male
Awl	6	13.0	3	5.0	*	none
Bone Refuse	2	4.0	4	7.0	*	none
Shell Beads	1	2.0	6	10.0	*	none
Metal Tool/Weapon	4	9.0	2	3.0	*	none

* Insufficient sample for statistical relevance. Items were judged as being age associated if there were at least two occurrences and all were associated with one age group. If there were ten or more occurrences, one anomaly was allowed.

any age group nor were some types of ceremonies and ornamentation.

Sex Associations

No statistically significant correlation exists between sex and the likelihood of being interred with funerary objects, but 89 percent of males as compared with 76 percent of females had associated objects. Other sex-related distributions are evident in individual artifact categories (Table 9.5). Artifacts associated either exclusively, or to a statistically significant degree, with males include projectile points and other chipped stone tools, turtle shells (rattles?), beaver incisors, and cut bear maxilla. There are suggested trends for three other categories of objects to be associated with males, but these items occur in insufficient numbers to allow meaningful statistical correlations. Of the 10 sexable individuals with pipes, only one is a female. Only two categories of objects, both ornaments, are associated with females: shell or bone beads and copper ornaments.

Sempowski (1987:52) has suggested that relative differences in male vs. female status can be investigated using a diversity scoring technique based on "the number of different kinds of artifacts in an offering." She assumed artifact diversity to be a measure of complexity of burial treatment and therefore of relative social status. Through analysis of burials from six sixteenth- and seventeenth-century Seneca sites, she used these scores to test the view, based on ethnohistoric accounts, that women held fairly high positions in Iroquoian society. Sempowski (1987) has argued that the significantly lower diversity scores observed for the 'Seneca females indicate a concomitantly lower status for women than men. When applied to the Ripley burial data, this diversity scoring also indicates that funerary offerings associated with males are more diverse than those with females. The average score for males is 2.51, while that for females is 1.26 (Coffin 1988).

At least two arguments can be made that funerary-object diversity is not necessarily correlated with symbolization of social prestige when the two sexes are being compared. As discussed above, the processes by which males and females gained high rank in Iroquoian society are quite different. In general, males were involved in activities that cross-cut kinship groupings, while females were most involved in kin-related activities. What may be symbolized in the mortuary ritual is the greater diversity of social roles for men (e.g., hunter, warrior, politician) than those available to women. Such differences in the number of available social positions or mechanisms for achieving them do not necessarily equate with differences in levels of prestige for the two sexes. Nor is it necessarily the case, for example, that a chief was more powerful than the clan mother who chose him, or that the members of a war party were more powerful than the women who had to agree to supply them with food. Differing roles in themselves do not constitute inequality; rather, it is the possibility of subjugation of one role by another and differential distribution of power that must be examined for evidence of social inequity.

A second problem with the postulated correlation between funerary-object diversity and social prestige are potential differences in artifact values. For example, does one projectile point and one bone awl have a greater value than one pot? There is currently no effective means of evaluating relative levels of energy expenditure represented by such materials.

Relative social prestige between the sexes is therefore more effectively demonstrated through a multi-dimensional analytical approach that serves to differentiate tiers or levels of rank within a society. If an upper echelon that is restricted to one sex can be identified, then arguments can be made concerning unevenness of the social positions of the sexes. The importance of a multi-dimensional approach easily can be demonstrated in the late prehistoric southeastern United States where work with several Mississippian societies has shown that interment in a mound with or without funerary objects can be a clear indicator of social prestige (Hatch 1974, 1976; Peebles 1971, 1974). Thus, while a non-mound burial may have a greater diversity of funerary objects, these objects are not necessarily an indicator of higher prestige than is burial in a mound.

Nonetheless, the diversity scores do serve to establish significant differences in male vs. female mortuary treatments, and by inference, they reflect the differing roles of the sexes within the society. These distinctions are also observable in the artifact association analysis. There appear to be more restrictions, or a clearer structure, governing the types of artifacts used as funerary associations for males than females. While there is no statistically significant difference in frequency of occurrence of funerary objects with males as opposed to females, there is clearly a greater variety of objects restricted to males as opposed to females. This patterning may be consistent with social practices, like those described for the Iroquois, that place males in different social trajectories than females and require males to form social groupings distinct from kin groupings in order to gain prestige.

Table 9.6. Variables for Cluster Analyses.

Variables	Bivariate Attributes
Positions	
Orientation	east/not east
Side	right/left
Multiple burial	single/multiple
Funerary Objects	
Pots	present/absent
Projectile points	present/absent
Other chipped stone tools	present/absent
Debitage	present/absent
Ground stone tools	present/absent
Bone/antler tools	present/absent
Ocher	present/absent
Minerals	present/absent
Copper ornaments	present/absent
Other ornaments	present/absent
Pipes	present/absent
Cut bear maxilla	present/absent
Turtle shells (rattles?)	present/absent
Metal tools/weapons	present/absent
Floral/faunal remains	present/absent

CLUSTER ANALYSES

Cluster analysis has proven to be a useful technique for objectively grouping burials most similar in terms of a number of predefined attributes (cf. Goldstein 1980; Hatch 1974; Peebles 1971; Quilter 1989; Sullivan 1986; Tainter 1975). As O'Shea (1984:69) has explained, it is currently not possible to evaluate statistically whether a particular cluster solution is the best possible partitioning of a given population. Cluster analyses are also primarily heuristic devices in that the results must be somewhat subjectively examined to extract the logic underlying the apparent divisions and to determine if this logic has cultural meaning. Interpretations of cluster analyses of mortuary data must thus be thematic and cannot assign social meaning to each small cluster of graves (O'Shea 1984:69).

For the Ripley Site data, hierarchical cluster analysis was used to group individual burials according to similarity in body positioning and funerary objects. An agglomerative technique using Ward's method (Everitt 1974:15) was employed using the SPSS/PC+ program. Eighteen binomial variables, based on presence/absence of a particular attribute, were used for the analysis (Table 9.6). Two cluster analyses were run, the first incorporating positioning as well as artifact variables, and the second excluding the positioning variables. All graves were coded for these analyses, but those with missing variables pertinent to a specific analysis were excluded from that analysis.

The positioning-and-funerary-objects analysis included 162 cases. Based on a marked rise in coefficient of variation, a three-cluster solution is suggested, but there are distinct subdivisions within these larger clusters and a general lack of chaining or tying together of individual or small groups of cases with no apparent structure (Figure 9.5).

Table 9.7 summarizes the membership of each cluster. One cluster (Cluster 1), comprised of 15 individuals, is especially distinctive. Seven of the eight individuals identifiable as to sex in this cluster are male, and no identified subadults are included. In general, this cluster is characterized by individuals associated with relatively large numbers and varieties of funerary objects.

Clusters 2 and 3 are composed of 59 and 88 individuals, respectively. Unlike Cluster 1, these clusters are largely determined by the body-positioning variables. Cluster 2 is defined by individuals oriented in directions other the modal eastern orientation, and Cluster 3 is defined by individuals with eastern orientations. Within Cluster 2 are major groupings defined by positioning on the right and left sides, respectively. The same is true for Cluster 3, with the addition of a grouping for multiple burials. The demographic profiles include members of both sexes, with a nearly equitable distribution in Cluster 2 and a predominance of females in Cluster 3. Subadults are represented in both clusters, comprising about 15 percent of Cluster 2, and 19 percent of Cluster 3.

In general, Clusters 2 and 3 are characterized by low numbers and varieties of funerary objects. No

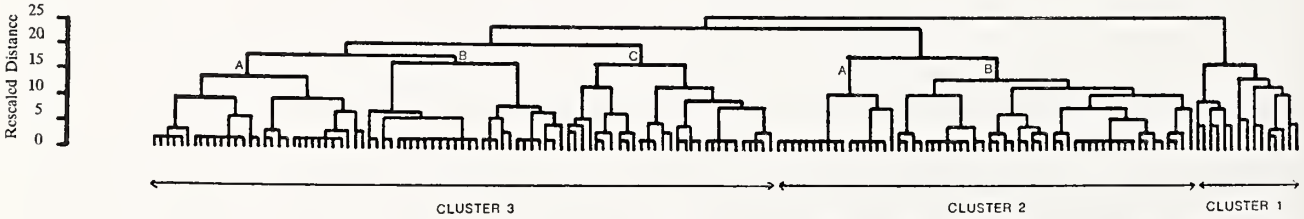


Figure 9.5 Dendrogram of the positioning-and-funerary-objects cluster analysis. Letter designations indicate potentially meaningful subclusters in the three main clusters.

TABLE 9.7. COMPOSITION OF CLUSTERS IN FUNERARY-OBJECTS-AND-POSITIONING ANALYSIS.

Cluster No.	No. of Individuals	Sex		Age		Defining Attributes	Members*
		Male	Female	Subadult	Adult		
1	**15**	**7**	**1**	**0**	**10**	**many and varied objects**	**C11, C12, CR24, H50, P41, CR22, P93, CR30, P72, CR16, P99, CR54, CR9, P35, P71**
2	**59**	**15**	**16**	**9**	**37**	**not oriented east**	
2A	17	4	3	3	11	left side, not multiple, pots	CR56, H54, P53, CR28, CR31, C20, CR20, P58, P82, P57, P9, H62, P10, P45, P54, P44, P20
2B	42	11	13	6	26	right side, not multiple, pots	P21, P75, P101, P25, P19, H56, P3, P5, P79, P4, P48, P104, H66, P69A & B, C3, C10, C8, CR62, P67, CR63, H5, P55, CR35, P8, CR52, H60, P1, P94, CR12, P14, P37, P106, P13, C18, C19, P18, P62, CR21, H53C, P11, H53A
3	**88**	**15**	**29**	**17**	**44**	**oriented east**	
3A	31	5	8	10	15	left side, not multiple	H11, H68A, P39, P97, C15, C21, CR60, H55, P63, C17, CR59, P96, C14, P70C, C16, CR14, C6, H19, C51, H59, H13, H57, P102, C2, CR39, P83, C1, P64, CR27, P100, P47
3B	28	3	9	1	17	right side, not multiple, pots	P36, P49A, CR40, H6, CR53, CR58, P19, CR25, CR26, P66, CR13, P38, P56, P26, P30, P12, P46, P91, CR15, P6, C7, P23, H9, P22, P51D, P65, C13, P90
3C	29	7	12	6	17	multiple, ocher	P81A & B, H52B, P95A, C9, CR23, P51A & B, P78A & B, C4, H48A, H58, P103A & B, P98A & B, H49B, H53B, P79, H49A, H52A, P70A & B, P73, P89A & B, H48B, P49B

* H: Burial excavated by Harrington; P: Burial excavated by Parker; CR: Burial excavated by Christensen; C: Burial excavated by Conklin

particular age or sex groups characterize either cluster, nor is there any combination of artifacts that distinguishes the clusters. While it may be tempting to suggest that the clusters represent horizontal social distinctions, there is no evidence to corroborate such distinctions based on body positioning. Thus, we must assume that distinctions between these clusters are a statistical artifact with no social significance. The socially significant difference lies instead in the distinction between these clusters and Cluster 1.

The funerary-objects-only analysis included 237 cases. A three-cluster solution again is suggested by the rise of the coefficient at that point, but the results can be more effectively discussed in terms of four clusters with component subgroupings. Similarity to the funerary-objects-and-positioning analysis can be seen in that there is one cluster (Cluster 1) that is particularly distinctive (Figure 9.6). The membership of each cluster is summarized in Table 9.8. Cluster 1 includes no identified subadults and, of 21 individuals identified as to sex, only four are adult females. Only one of these females was not associated with a multiple burial. Within Cluster 1 are three general subgroupings defined by various combinations of artifacts. One grouping is defined by pots, chipped stone tools other than projectile points, and metal (other than copper or brass) objects. Another is defined by pots and projectile points, and the third by a wide variety of objects including pots, projectile points, debitage, chipped stone tools, ocher, and bear maxilla. The age composition of this latter group is skewed toward older adults. It includes four individuals categorized as "mature" adults (ca. 31-40 years) and two individuals classified as "old" adults (>40 years). The other two subgroupings include one "young" adult (21-30 years), and one young adult and three mature adults, respectively.

Cluster 2 includes 89 individuals, more of which are identified as females than males, and subadults are well represented. This cluster is characterized by individuals associated with pots but few other objects. One major subgrouping includes those individuals associated with pots only. A second subgrouping include individuals with pots, ground stone tools, and red ocher.

Like Cluster 2, Cluster 3 includes more females than males, and subadults are well represented. This cluster is similar to Cluster 2 in that it is defined by association with pots and one or two other types of objects. One subgrouping includes individuals with pots and copper objects. Only one of 12 skeletons in this group identifiable to sex was male. Another subgrouping is defined by individuals with pots and pipes or bone or shell ornaments.

Cluster 4 generally is distinguished by lack of funerary objects. The major subgrouping has no objects, and a small subgrouping is associated with chipped stone tools or pots. Females comprise a higher proportion of this cluster than males, and subadults are especially well represented.

These analyses suggest important organizing principles about the society at the Ripley Site. As predicted, given the general model of Iroquoian social structure, two tiers are recognizable in both analyses. A small portion of the mortuary population is distinguished by a large and diverse array of funerary objects. Also, as predicted, none of the individuals in the upper tier is a subadult. Females are included in the upper tier, but in lesser numbers than males. It is unclear whether inclusion of three of the four females in the upper tier in the funerary-objects-only analysis was influenced by their presence in multiple burials. Perhaps funerary objects inferred as associated with them alone were actually intended for more than one individual. The only female clustering in the upper tier of the funerary-objects-and-positioning analysis is the one female of this group that was not associated with a multiple burial.

The composition of the clusters suggests at least one type of artifact that may serve as a symbol of authority or status marker. Cut bear maxilla (Figure 9.7), usually placed on top of the skull in a position suggesting a headdress, are associated with seven probably male individuals, six of whom occur in the

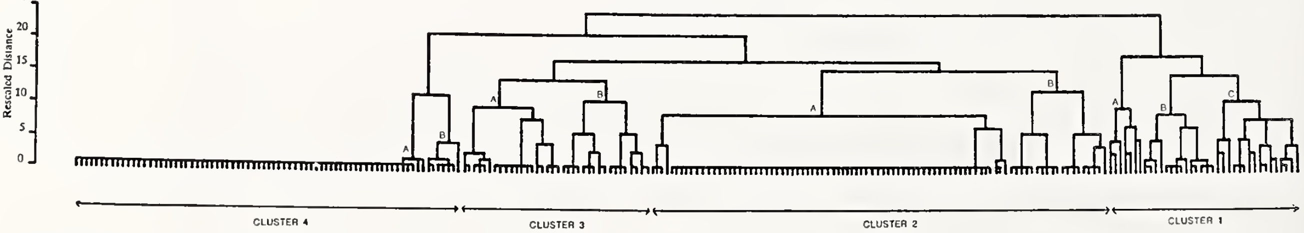


Figure 9.6 Dendrogram of the funerary-objects cluster analysis. Letter designations indicate potentially meaningful subclusters in the three main clusters.

Table 9.8. Composition of Clusters in Funerary-Objects Analysis.

Cluster	No. of	Sex		Age			
No.	Individuals	Male	Female	Subadult	Adult	Defining Attributes	Members*
1	**37**	**21**	**4**	**0**	**25**	**many and varied objects**	
1A	7	3	1	0	4	pots, chipped stone tools, metal objects	P41, CR22, C11, CR24, H50, P93, CR30
1B	14	9	2	0	10	pots, projectile points	P18, H59, H53A, P12, P49A, P62, P36, CR47, P100, P98A & B, P51C, H2, P104
1C	16	9	1	0	11	pots, projectile points, debitage, chipped stone, tools, ocher, cut bear maxilla	CR8, CR16, P72, P95A & B, P76, P35, CR33, CR23, CR54, P99, CR9, P81A & B, H52B, P71
2	**89**	**11**	**25**	**16**	**37**	**pots**	
2A	70	8	18	12	28	pots	CR21, H53C, H5, P11, H57, H60, P19, H13, H54, CR58, H1, CR55, CR56, CR52, CR53, CR38, CR39, CR34, CR37, CR31, CR32, CR26, CR28, CR20, CR25, CR13, CR18, CR10, CR12, CR4, CR7, C10, C20, C2, C3, P61, C1, P83, P94, P78B, P82, P74A & B, P74, P64, P66, P57, P58, P50, P38, P42, P33, P37, P30, P31, P26, P29, P14, P17, P12, P13, P106, P107A, P1, P102, CR41, CR48, C8
2B	19	3	7	4	9	pots, celts, other	H48A, H58, P103A, CR49, CR63, C9, CR62, P67, P69A & B, C21, H49A, P92, CR57, CR35, CR36, P51B, P55, P8
3	**36**	**7**	**14**	**11**	**21**	**pots, pipes, copper, and ornaments**	
3A	19	1	10	4	12	pots, copper	P90, H12, CR27, CR50, CR29, P51A&D, H7, H9, P22, P91, CR15, P46, P23, CR42, H66, P65, P80, C13
3B	17	6	4	7	9	pots, pipes, ornaments	C18, C19, C4, C5, H19, H48B, C6, P21, P75, P25, P60, P101, P47, P34, C7, P20, P6
4	**75**	**8**	**15**	**24**	**31**	**no objects**	
4A	68	6	14	24	26	no objects	H68A, H68B, P10, H62, H64, H55, H52A, H52C, H36, H49B, H11, H14, H4, H10, CR46, H3, CR60, CR61, CR51, CR59, CR43, CR44, CR17, CR19, CR6, CR11, CR3, CR5, CR1, CR2, C17, C14, C15, P96, P97, P89A & B, P9, P81C, P78A, P79, P73A & B, P70AB&C, P63, P4, P59, P5, P52, P45, P48, P4, P44, P3, P39, P24, P27, P16, P2, P107B, P15, P103B, H53B, CR45
4B	7	2	1	0	5	chipped stone tools, pots	CR40, H6, P78C, C16, P49B, CR14, P7

* H: Burial excavated by Harrington; P: Burial excavated by Parker; CR: Burial excavated by Christensen; C: Burial excavated by Conklin

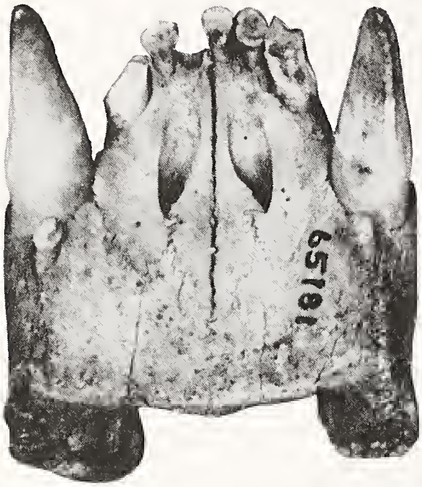


Figure 9.7 Cut bear maxilla headdress(?) associated with a burial in Harrington's Pit 52. The maxilla is 6.5 cm wide.

Figure 9.8 Trade adze or chisel associated with a burial in Christensen's Pit 49. The length of the chisel is 12 cm.

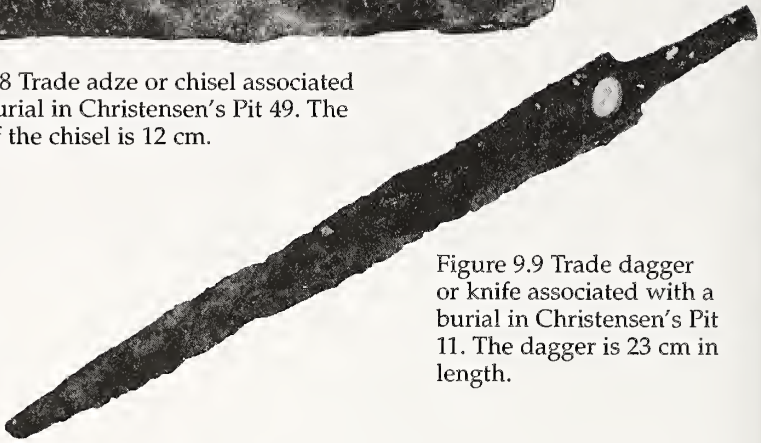


Figure 9.9 Trade dagger or knife associated with a burial in Christensen's Pit 11. The dagger is 23 cm in length.

upper-tier clusters. The one exception is a burial excavated by Parker (Burial 20), whose only other funerary object is the Janus pipe illustrated in Parker's report (1907:Figure 8). Body-positioning information exists for six of the individuals with the cut maxilla, and suggests some possible evidence for horizontal differentiation. All were interred on the left side, but their orientations differ.

Metal European trade goods, other than copper ornaments, are also recurring with individuals in the upper tier. Although fragmentary and heavily corroded, most of these objects appear to be iron or steel chisels, adzes, or celts (Figure 9.8). A few are knives or daggers (Figure 9.9). Ten of the 13 individuals with these artifacts were in the upper tier in the funerary-objects-only analysis, and of the nine individuals with these objects in the funerary-objects-and-positioning analysis, eight are in the upper tier.

The one identified female in the upper tier of both analyses was adorned with copper (or brass) rings and arm bands plus a shell bead necklace with pendants (see Parker 1907:Plate 14). Other females with copper or brass ornaments occur together in a subgrouping of Cluster 3 in the funerary-objects analysis. The other major Cluster 3 subgrouping includes females with ornaments made of shell or bone, rather than copper or brass, and males with pipes. Pots are also standard accompaniments for the members of this cluster. The parallelism of these subgroupings suggests a temporal factor is involved–substitution of European-derived copper or brass ornaments for native ones of shell and bone, but with no change in social meaning.

LOCATIONAL ANALYSES

Cluster analysis also is a useful preliminary tool for investigating burial spatial patterning. Plots of the resulting clusters can be made on a site plan map and then examined for evidence of locational patterning. Locations of the individuals in the upper tiers of both cluster analyses, as plotted on the schematic plan of the Ripley Site, indicate that these burials are distributed throughout the site (Figure 9.10). While no separate place of interment was set aside for these individuals, there appears to be a disproportionately larger number of upper-tier burials in the southern half of the knoll, as opposed to the northern half. No features other than burial features are reported for the southern portion of the site.

In order to determine if a temporal factor might be involved in burial placement at the site, a third plot (Figure 9.11) showing locations of burials with definite European trade goods (iron and steel objects and glass beads) and probable trade goods (copper or brass arm bands) was made. With the exception of one infant with copper ornaments, the burials with trade goods are located in the southern half of the site. It is thus possible that later mortuary use of the site was directed toward the southern portion of the knoll.

RIPLEY SITE SOCIAL ORGANIZATION

Several important concepts concerning the organization of Ripley Site society emerge from these analyses, despite the problems and limitations of the data. Two tiers of social ranking are suggested by the

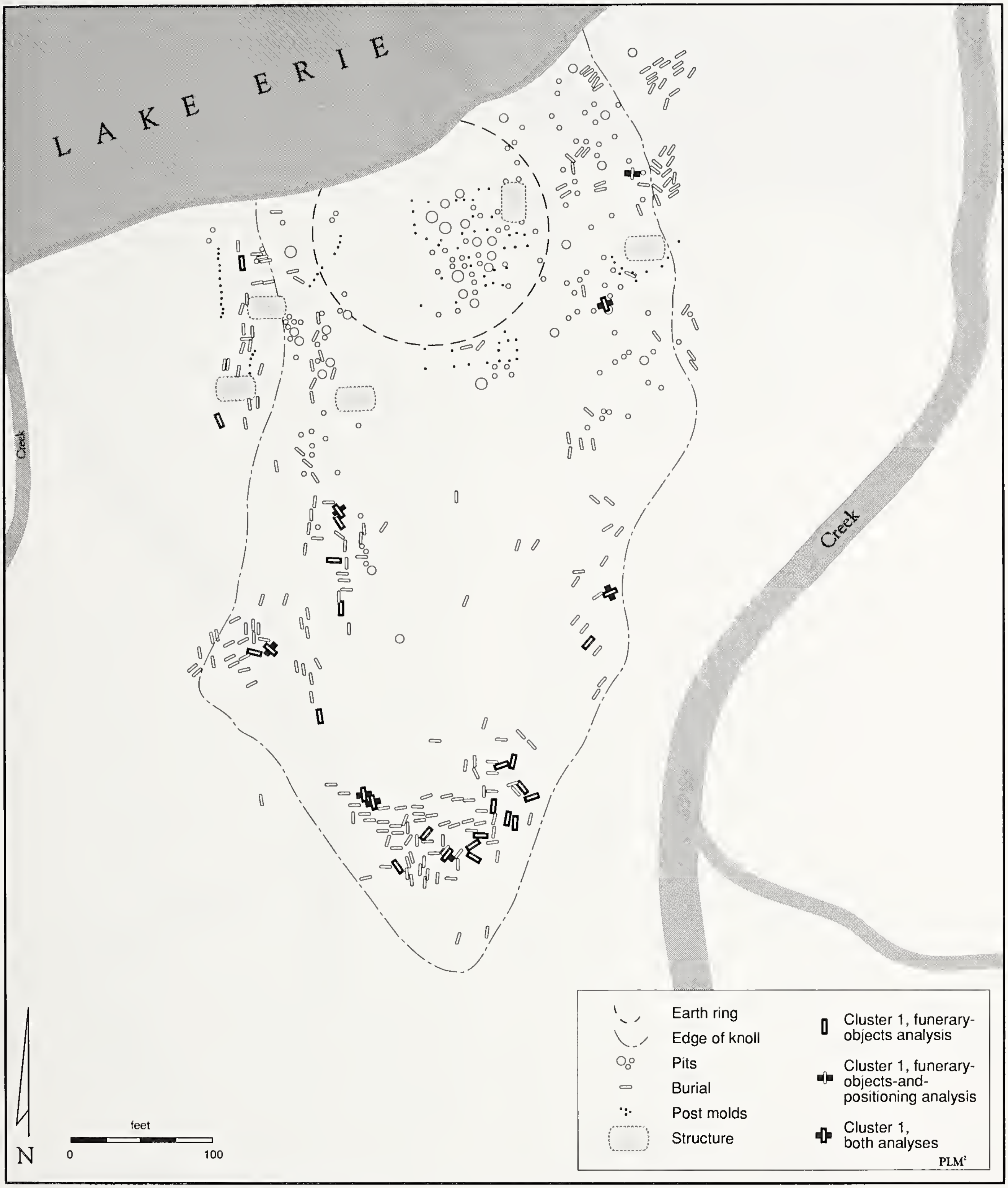


Figure 9.10 Locations of upper-tier burials.

cluster analyses. A relatively small group of individuals were afforded mortuary treatment that is somewhat distinctive from the rest of the population. These distinctions are limited to number and variety of funerary objects. The high percentage of individuals with funerary objects (72 percent) suggests that access to this treatment in itself was not restricted to a small segment of the population. Instead, placement of

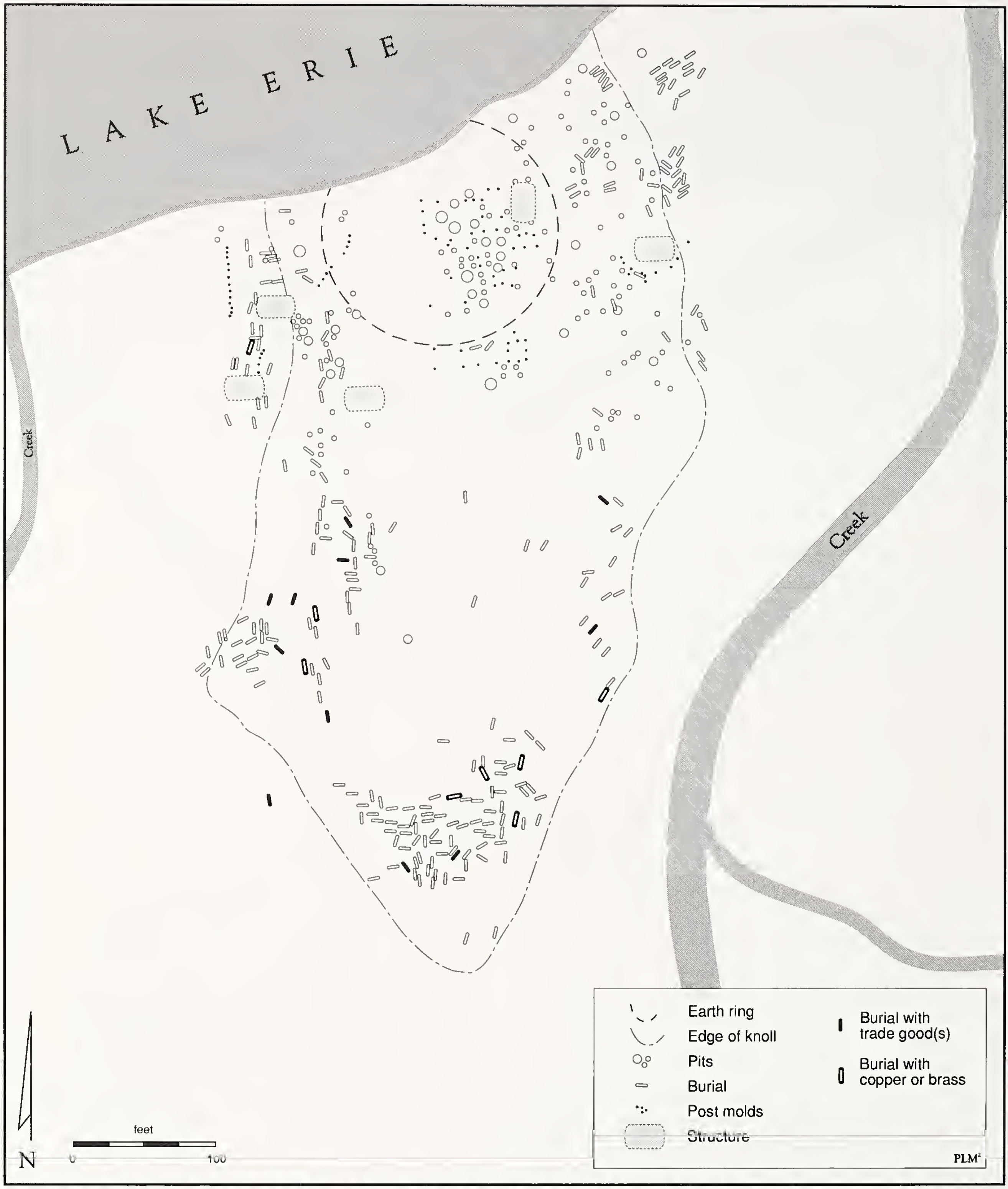


Figure 9.11 Locations of burials with trade goods. Note that these burials occur mainly toward the southern portion of the site.

funerary objects with the dead was a typical and usual practice. No value-imbued distinctions in deposition or spatial location were apparent for the individuals in the distinctive group as compared with others. This inferred upper social tier is composed entirely of adults, most of whom are male.

The demographic composition of this group suggests a relatively egalitarian form of social structure with social prestige based upon an individual's age, sex, and personal abilities. Females do occur in this upper tier, but in lesser numbers than the males and often in the context of a multiple burial. The more diverse array of funerary objects associated with males further suggests that a wider range of social roles was available to men than women, and that it may consequently have been easier for males to achieve prestige than females. Such differential access did not, however, preclude women from gaining prestige equal to men; it may have simply been more difficult.

The existence of such an upper tier in the Ripley Site society fits well with the generalized model of Iroquoian sociopolitical organization portrayed in ethnohistoric accounts. Higher ranking individuals would have included the various chiefs, clan matriarchs, and leaders of various non-kin-based groups, such as medicine societies and warrior groups. The subgroupings within Cluster 1 in the funerary-objects cluster analysis is suggestive of some age-grading within this tier; that is, the subgrouping with the older individuals is also the group with the most diverse and numerous array of objects.

It is difficult to point to evidence for horizontal differentiation in the Ripley Site data. No evidence for spatially discrete burial areas that may correlate with horizontally differentiated groups, such as clans, could be detected. It is tempting to suggest that body positioning (right vs. left side) is correlated with horizontal differentiation (moieties?), since there is a relatively normal demographic distribution of individuals interred in each position. Placement of the upper-tier individuals with cut bear maxilla on the left side suggests that this probable headdress may have related to leadership of a horizontally differentiated group, but there is no parallel symbol for upper-tier individuals interred on the right side. Without such corroborating evidence, an interpretation of body positioning as symbolic of horizontal social differentiation is unsubstantiated. Perhaps a finer scale evaluation of artifact stylistics, especially of the pottery, would aid in detecting horizontal differentiation.

Special statuses are also difficult to discern. It is possible that such individuals are masked as part of the upper tier due to the unusual array of funerary objects that may be associated with them. Alternatively, the individuals with burial positioning other than the norm (i.e., extended or bundle burials) may represent such statuses. The specific nature of any special statuses is unclear.

While the mortuary practices at the Ripley Site suggest conformity with a very generalized model of Iroquoian social organization, such a model is insufficient to characterize more fully the Ripley Site society or to explain variation among Iroquoian groups. Comparison of mortuary practices between groups can aid in building more precise models. Since the occupation at the Ripley Site extends into the Contact Period, it especially is important to understand possible cultural variations in response to European contact and the consequential impact on local Iroquoian groups. The roles that local cultural variability and geographic locality may have had in shaping such responses are far from clear. Comparative information available from the work with Seneca sites by Sempowski and her colleagues (Sempowski 1987; Sempowski et al. 1988) makes it possible to begin to address such questions.

Comparison of the Ripley and Seneca Sites

The Seneca, a well-documented Iroquoian tribe and member of the Iroquois Confederacy, were historically located on the eastern margins of the Chautauqua/Allegheny region. A series of village movements, proposed for the Seneca during the sixteenth and seventeenth centuries (Wray 1973; Wray and Schoff 1953), suggests movement of two villages in a generally northerly direction, forming parallel western and eastern sequences, respectively, for each village. All sites are located in the area east of the Genesee River, south of present-day Rochester, New York.

The possibility of discovering ethnic distinctions between mortuary populations preliminarily was explored by O'Shea (1984:286-301). He suggested that it may be difficult to make such distinctions when societies share generally similar forms of social and economic organization, as presumably may be the case with the society at the Ripley Site and the early historic Seneca. Differences between temporally divergent sites of the same ethnic group may be greater than differences between temporally similar sites of different groups. There is some indication, however, that divergences in the norms (i.e., the most usual forms of mortuary treatment) may be related to ethnicity. With these caveats in mind, comparisons between the Ripley and Seneca data will focus on distinctions between the norms of the mortuary practices as well as on distinctions identified in the Seneca data as resulting from or related to European contact.

Data concerning frequency of burials with artifact associations, burial orientations, frequency of multiple burials, funerary-object diversity, and association of artifact categories with the sexes are available for comparing the Ripley Site with several sixteenth-century Seneca sites, including the Adams and Culbertson sites (ca. A.D. 1570) and the Cameron Site (ca. A.D. 1590), and the late prehistoric Harscher Site (Sempowski et al. 1988). The Adams and Cameron sites are interpreted as sequentially occupied villages in the western sequence of villages, and the Culbertson Site is considered to be the earliest village in the eastern sequence. The Harscher Site is thought to be ancestral to the historic Seneca village sequences (Sempowski et al. 1988).

A trend of increasing frequency through time in occurrence of funerary objects has been observed for the Seneca sites. The 56 percent (n=250) and 50 percent (n=16) of individuals interred with funerary objects at the Adams and Culbertson sites, respectively (Sempowski et al. 1988), are quite distinct from the 15.2 percent (n=33) figure for the possibly antecedent, late prehistoric Harscher Site. The 72 percent of burials with funerary objects at the Ripley Site is more comparable with the later sites. Sempowski et al. (1988:101) have suggested that an increase in funerary-object frequency is a pervasive time-related phenomenon throughout the Northeast.

Grave orientations for the Ripley and Adams sites are similar only in that an easterly orientation is most frequent (Figure 9.12). Westerly orientations are the least frequent at the Ripley Site, but are nearly equal to easterly orientations at the Adams Site. Orientations at the Culbertson Site are even less similar to those at Ripley, as the most frequent orientation is westerly (Sempowski et al. 1988). Interestingly, the distribution of orientations at the Ripley Site virtually is identical to the prehistoric Harscher Site (Figure 9.12).

Sempowski et al. (1988) have interpreted the shift in orientations from the prehistoric to protohistoric Seneca sites as part of a constellation of changes suggesting integration of foreign war captives or refugees (mostly females) into the populations at the later sites. If this interpretation is correct, such processes of population amalgamation are not evident in the burial orientations at the Ripley Site.

The frequency of multiple burials at the Ripley Site is 14 percent. At both the Adams and Culbertson sites, the frequencies of multiple burials are over 50 percent (Sempowski et al. 1988). Sempowski et al. (1988) have interpreted this high incidence of multiple burials at the Seneca sites as possible evidence of famine or epidemic diseases as a result of European contact. Again, the Ripley Site data do not compare favorably with the Seneca sites.

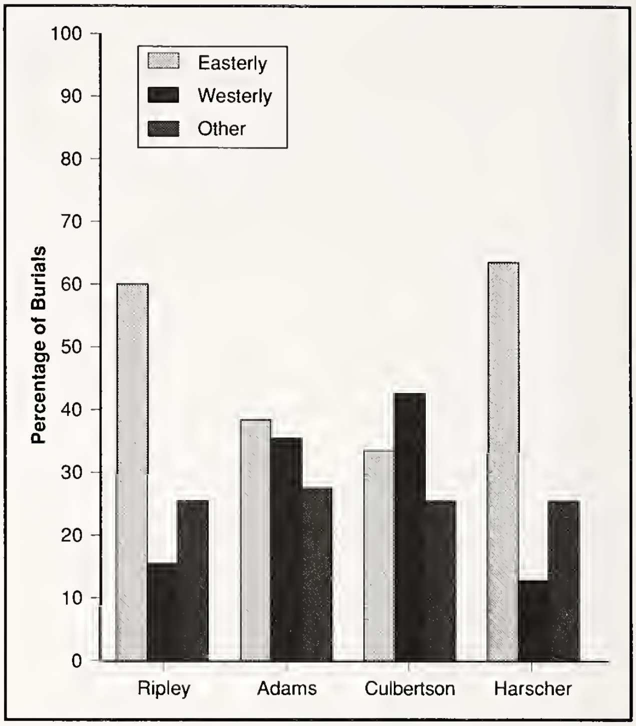


Figure 9.12 Comparison of Ripley and Seneca site burial orientations. Note that the Ripley distribution is very similar to that of the Harscher Site.

"A diverse and abundant array of European and native-made goods" constituted the grave associations at sixteenth-century Seneca sites (Sempowski et al. 1988:101). This diversity in protohistoric funerary objects is a marked increase over the prehistoric Seneca sites, and a trend in increasing diversity continued through much of the seventeenth century (Sempowski 1987:52-53; Sempowski et al. 1988:101). The Ripley Site burials contrast markedly with those of the Adams Site in the range of diversity scores (Table 9.9). The scores are much lower for the Ripley burials, indicating a more restricted variety of artifacts buried in graves at Ripley than at the Adams Site. Diversity scores for the Cameron Site are more comparable to those at Ripley, but the sample size for Cameron is small (Table 9.9). Whether the observed difference between the Ripley Site and the Adams Site is due to availability of goods or cultural practice is unclear.

Although the pattern of higher male vs. female diversity scores is consistent for both Ripley and the Seneca sites, there are distinct differences in distributions of kinds of artifacts between the sexes. Food-related funerary objects are consistently associated with a higher percentage of females than with

TABLE 9.9. COMPARISON OF FUNERARY-OBJECT DIVERSITY SCORES AT THE RIPLEY AND SENECA SITES.

	Ripley Site		Seneca Sites			
			Adams Site		Cameron Site	
	Male	Female	Male	Female	Male	Female
n	39	46	53	54	11	12
Mean	2.46	1.32	4.09	2.18	2.45	1.50
Range	1-10	1-9	1-15	1-12	1-8	1-3

males at Seneca sites (Sempowski 1987). At the Ripley Site, the distribution is nearly equal, with males having a slightly higher percentage (Figure 9.13). The distribution of ornamental objects also is different at Ripley. Only 9 percent of male burials have these items as compared with 16 percent of the females (Figure 9.14). Differences in ornamental objects between the sexes at the Seneca sites are not as distinct. Distributions of tools and weapons between the sexes are similar for the Ripley and Adams sites (Figure 9.15). The nearly equitable distribution at the Cameron Site is puzzling and again may be due to problems of sample size (Sempowski et al. 1988). Distributions of ceremonial items are similar at all three sites (Figure 9.16), but there are some differences in associations of specific items. At the Seneca sites, turtle shell rattles were more frequently found with females (Sempowski 1987). At the Ripley Site, these items occurred only with males. Pipes at the Seneca sites more often were with males, but not exclusively (Sempowski 1987). At Ripley, there is one possible instance of a pipe with a female, but it is not clear from Parker's report (1907:495) if the pipe actually was associated with the skeleton or with a pit above the grave.

These comparisons of the Ripley Site and Seneca mortuary practices indicate distinct differences in burial orientations, frequencies of multiple burials, ranges of funerary-object diversity, and associations of various categories of funerary objects with the sexes. These differences suggest ethnic or local cultural variation, implying that the archaeologically represented societies at the Ripley and Seneca sites were separate entities. The magnitude of these differences

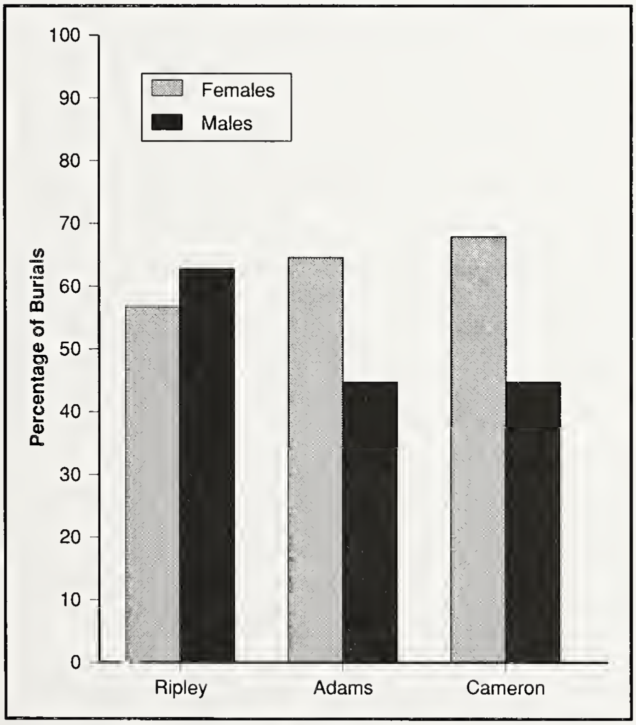
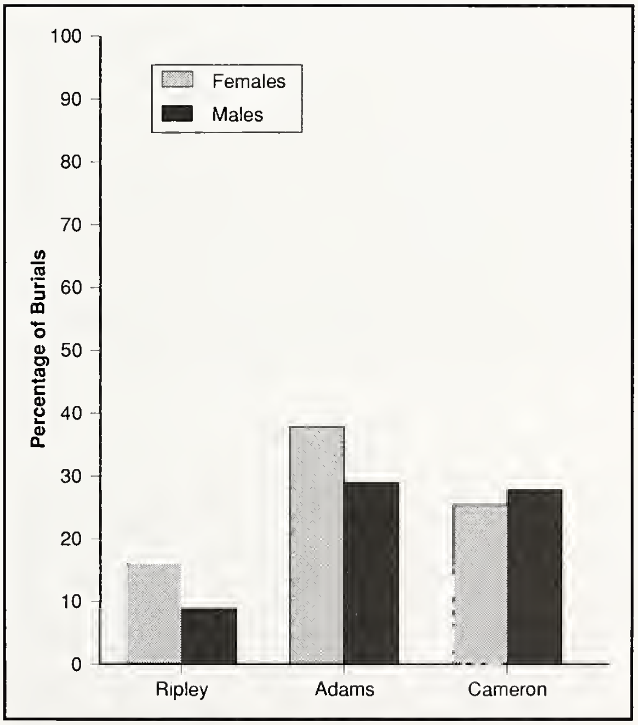


Figure 9.13 Comparison of the use of food-related items as funerary objects at the Ripley and Seneca sites.



9.14 Comparison of the use of ornaments as funerary objects at the Ripley and Seneca sites.

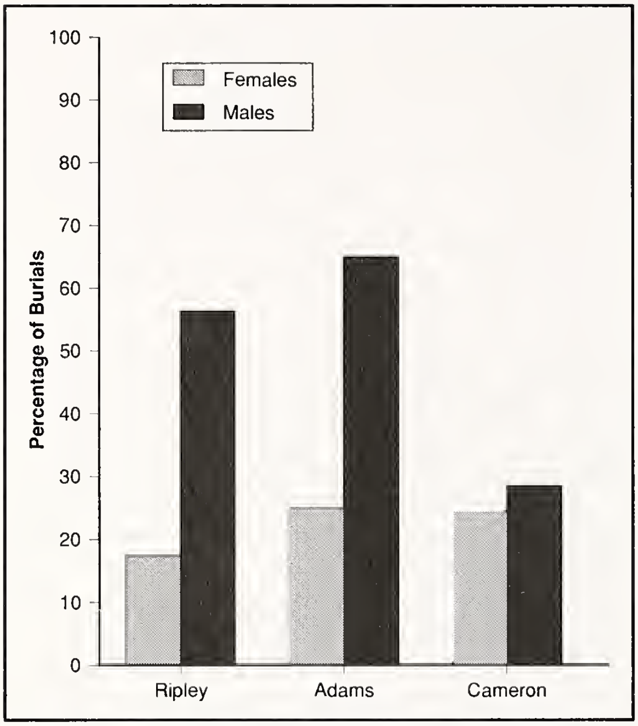


Figure 9.15 Comparison of the use of tools and weapons as funerary objects at the Ripley and Seneca sites.

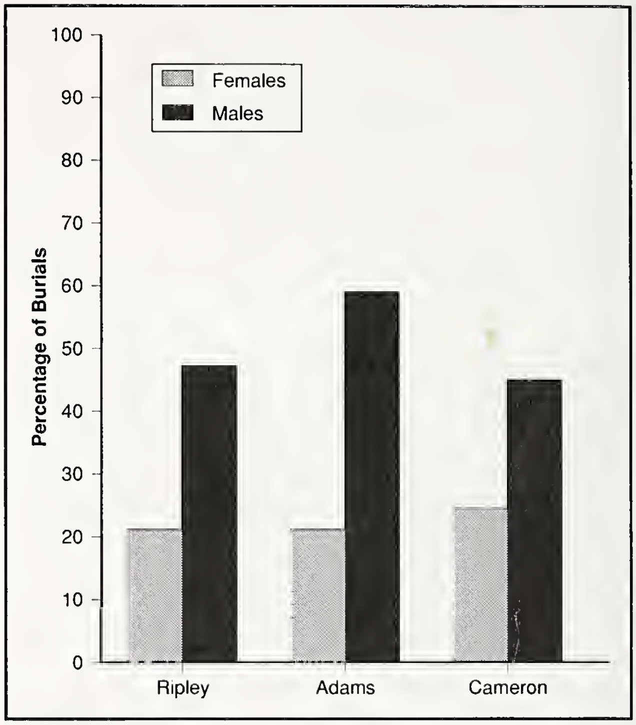


Figure 9.16 Comparison of the use of ceremonial objects as funerary objects at the Ripley and Seneca sites.

is difficult to judge because of the absence of comparative data for other Iroquoian societies and the lack of more precise temporal control of the Ripley data.

A consistent difference between the Ripley and Seneca data is the absence at the Ripley Site of mortuary practices interpreted by Sempowski et al. (1988) as indicators of disruptive processes associated with European contact. The similarity of burial orientations at Ripley with precontact Seneca sites, and the lower frequencies of multiple burials and European trade goods at Ripley may suggest less direct contact with Europeans for the Ripley population than for the sixteenth-century Seneca. Whether this difference is temporal is not yet established.

SUMMARY

The social dimensions of mortuary practices at the Ripley Site have provided us with insights to the organization of this society, despite the problems inherent in using data derived from antiquated collections. The general structure of the Ripley society compares favorably with a generalized model of Northern Iroquoian sociopolitical organization as portrayed in ethnohistoric accounts. A relatively small group of individuals were afforded mortuary treatments that are somewhat distinctive from the rest of the population in terms of number and variety of funerary objects. These individuals were all adults, and most were male. The restricted demographic composition of this group suggests a social structure in which social prestige was based mainly upon an individual's age, sex, and personal abilities rather than a system of inherited status. Using the Iroquoian model, these presumably higher ranking individuals would have included the various chiefs, clan matriarchs, and leaders of various non-kin-based groups, such as medicine societies and warrior groups. The age-based distinctions in numbers and kinds of funerary objects are consistent with increased rank with age and social roles that differed for adults and children. These findings are consistent with Iroquoian age-grading as described by Fenton (1978:314).

Gender-based differences in mortuary treatments, especially the more diverse array of funerary objects associated with males, suggest that a wider range of social roles were available to men than women, and that it may have been easier for males to achieve prestige than females. Such differential access did not preclude women from holding ranks equal in status to men, as evidenced by the presence of females in the distinctive cluster. The fact that females were a minority in this group possibly indicates that achieving such status was more difficult for females than males. An additive effect may also characterize male mortuary symbolism, as males progressed though the age-ranks from young warriors to leadership positions. Roles for females were not as highly structured as those associated with the male-dominated war organization and the various chiefly positions.

Comparison of mortuary practices between groups is essential for understanding variation among Iroquoian groups and moving beyond very generalized social models. Comparisons of Ripley data with those from Seneca sites indicate enough differences in a variety of mortuary practices to suggest that the two data sets represent separate social entities, such as ethnic groups or localized cultural variants. The data also indicate less direct contact with Europeans for the Ripley population than for the sixteenth-century Seneca. A possible temporal basis for this difference is not yet established. Nonetheless, more comparative information is needed so that we can begin to better understand the differential effects of European contact on various Iroquoian peoples and to expand our present knowledge of cultural variation in societies categorized as Iroquoian.

ACKNOWLEDGMENTS. Several persons have been instrumental in collecting, collating, and coding the data presented in this chapter. Lynn Moerman and Melissa Churchill spent time extracting information from the various excavators' notes and reports and transforming it into computerized files. Richard Wilkinson provided expert advice on the age and sex data as well as helpful discussions on the meanings of the observations. Martha Sempowski graciously shared her data on the Seneca sites. Any misinterpretations or errors are, of course, our own.

CHAPTER 10

THE RIPLEY SITE: DOMESTIC OR CEREMONIAL?

Lynne P. Sullivan

The preceding chapters demonstrate that some preliminary statements can be made about the nature of the Ripley Site even though the present sample is less than ideal for many types of analyses. Several investigators suggest that because Parker's village interpretation appears at odds with their data, the site might better be interpreted as a place for mortuary rituals. Association of earthworks with ritual, and especially with mortuary ceremonialism, certainly is not foreign in eastern U.S. prehistory, but this association is not well documented in the northeastern states or for so late a time period as proposed for the Ripley Site (although see below regarding seventeenth-century Huron "mounds").

Current anthropological theories about the workings of tribal societies suggest that the Ripley Site has equal potential for being either a specialized mortuary site or a fortified village. The argument can be made that both defensive structures and special disposal areas for the dead can be linked to pressures brought about by a sedentary lifestyle and increased dependence on plant cultivation. Maintenance of formal disposal areas for the dead is associated with development in relatively non-centralized societies of more complex kinship structures and corporate groups, including territorially based descent groups, as a result of a need to control critical but scarce resources (Chapman 1981). Chapman (1981) has also suggested a link between level of investment in mortuary facilities and intensification of competition. The symbolic presence of ancestors in formal disposal areas legitimizes the claim to control and use critical resources.

The development of such formal disposal areas can signal both social change and resource stability, and the mortuary ritual serves as a mechanism for social integration and maintenance of group identity. A particularly extreme example of this function of mortuary ritual from the Great Lakes area is the Huron's Great Feast of the Dead, which symbolized and cemented tribal unity through periodic placement of the dead in formal ossuaries covered with mounds (Heidenreich 1978:374-375). It should be noted that such ossuaries are reported from the Chautauqua/Allegheny region, date to the late prehistoric period, and are sometimes associated with earthen enclosures (e.g., Shock 1974:94; Squier 1851).

Resolving the problem of the function of the Ripley Site not only requires demonstration that the data do not support interpretation of the site as a village, but that they are consistent with use for mortuary ritual. The latter argument requires development of a model of the material correlates of Northern Iroquoian mortuary ceremonialism and comparison of relevant data with this model. This chapter integrates the results of the analyses of the older collections into a such a framework. First, the findings are compared with the main premises of Parker's interpretation. Then, ethnographic and ethnohistoric information is used to develop a model of Iroquoian mortuary ceremonialism that can be compared with data from the site. A preliminary appraisal of this model indicates critical gaps in existing data that must be filled with information from new excavations. The final part of the chapter discusses the implications for regional models if the Ripley Site is redefined as primarily a place for mortuary ceremonialism, rather than as a fortified village.

EVALUATING PARKER'S INTERPRETATION

Questions of site function, temporal placement, and ethnic affiliation are central to examining Parker's interpretation of the Ripley Site as a fortified protohistoric village of the Erie. As a preliminary test of the major tenets of Parker's interpretation, the following section outlines issues raised by the various analyses as they pertain to each question.

Was the Site a Village with an Associated Cemetery?

Parker's interpretation of the primary function of the Ripley Site as residential is directly challenged by P. Neusius's examination of the chipped stone artifacts (Chapter 6). Nearly 50 percent of the chipped stone items in the Parker collection are small triangular projectile points. The high incidence of projectile points as compared with other types of chipped stone tools is counter-intuitive for interpreting the site as a long-term habitation site where many activities would have taken place. Bias resulting from Parker's collecting strategies is an obvious factor, but at the time of this writing, a preliminary assessment of the lithics from the 1988 excavations indicates that this pattern holds true for these materials as well.

The projectile points also show a high degree of facial regularization, diverging from the expedient technology often associated with manufacture of such points. No edge modification was present on 43 percent of the points, which indicates that much effort was invested in making tools that were never used. Provenience information for the projectile points is sufficient to determine that these trends are consistent for non-funerary as well as funerary items. The presence of these highly stylized tools, especially ones that show little indication of use, is again inconsistent with routine domestic activities.

The bone tools (Chapter 7) exhibit patterns similar to the chipped stone artifacts. Forty-six percent of the bone objects are beads or tubes, 24 percent can be considered utilitarian in nature, and 30 percent cannot be assigned to either category. Less than half the utilitarian items show any indication of use. Specific provenience information is lacking for nearly half these items, so it is unclear whether these patterns hold true mainly for funerary objects or for materials from the site in general.

Compilation of information from excavations done between 1904 and the 1960s shows that Parker's interpretation of a spatially segregated village and cemetery is not valid. Subsequent investigators discovered graves in virtually all areas of the site. As noted above, the only possible exception is the north-central portion in the vicinity of the earth ring where few burials are reported, but the imprecise nature of the excavation maps prevents full confidence in this interpretation of the site plan. Nonetheless, graves do not seem to be limited to only certain sections of the site, as Parker proposed.

The current lack of detailed and reliable descriptive information about structures at the Ripley Site makes any meaningful discussion about possible function(s) of these buildings impossible. Five oval-shaped structures, each measuring approximately 9 m x 5 m, have been reported from the Harrington (1904) and Conklin (1962) excavations. Harrington's map (Figure 4.6) also includes several linear patterns of post molds that form no discernible structure. Conklin provided the only detailed map of a structure at the Ripley Site (Figure 4.11), but his excavation and recording techniques raise questions about the map's accuracy. Parker (1907:Plate 4) noted the presence of a "lodge site" as well as a number of post molds within the earth ring on his map of the "village" excavations. The structure pattern shown on his map is rectangular and appears to be of smaller dimensions than the reported oval-shaped structures, although the size is difficult to discern because the scale on Parker's maps is not accurate. He (1907:480-490) also mentioned possible "wigwams" or "lodge floors" in the text, but did not discuss their size or configuration. Information about the structures at the Ripley Site clearly is biased by excavation and recording techniques and emphasis on burial excavation, but Conklin's structure map compares favorably with the patterns observed by Harrington, implying that comparatively small, oval-shaped structures were present. To date, no longhouse-type structures have been recorded at the Ripley Site.

Parker's interpretation of the site as a village and cemetery complex similar to those known for Iroquoian groups of the Historic Period is not supported when all the available evidence is considered. The lack of variety in functional categories represented in the flaked stone tools is inconsistent with a village occupation where a wide variety of tasks would be performed. The low percentages of chipped stone, bone, and shell artifacts that show evidence of use are also incongruent with sustained and varied domestic activity at the site. The occurrence of burials in all areas of the site, except possibly inside the earth ring, indicates that Parker's idea of a spatially segregated cemetery is not entirely accurate, and lack of clear evidence of typical Iroquoian domestic structures (i.e., longhouses) is incompatible with a village occupation. The fact that the earthen ring did not encircle a possible habitation area (four of the five reported structures are outside the ring) suggests that the ring was not intended for defense of these structures.

One type of activity that clearly was conducted at the Ripley Site is burial of the dead, as evidenced by the large number of graves. The plausibility of an interpretation of the site as a primarily place for mortuary ceremonies finds general support in the fact that finely crafted artifacts and earthen structures often are characteristic of American Indian mortuary sites in the Eastern Woodlands (Bushnell 1920). Detailed consideration is given to this alternative interpretation in the second part of this chapter.

Does the Site Date to the Late Sixteenth/Early Seventeenth Century?

The question of chronological placement of the Ripley Site beleaguers most of the analyses and interpretations in this volume. Several lines of evidence point toward a multicomponent occupation at the site, although it is not possible, given the resolution of the extant collections, to adequately deal with this issue. The inability to perform feature-content analysis with most of these materials is a major factor in this problem.

Schock (1974) has suggested that the Ripley Site is multicomponent based on the ceramic assemblage. He originally observed that a high frequency of collared and decorated vessels and a low frequency of shell-tempered and simple stamping in the Ripley ceramic assemblage was not consistent with sites of the Chautauqua Phase, which he defined as the latest prehistoric phase in southwestern New York (Schock 1974:262). He later revised his observations to note that ceramics from the Ripley Site do include shell-tempered pottery "which is shaped and decorated in non-Iroquoian styles," but that there are enough differences between the Ripley Site assemblage and that of the Chautauqua Phase to "leave their relationship in doubt" (Schock 1976:109). He concluded that "there is even some question as to whether the Ripley Site represents more than one component."

In general, the ceramics in the existing collections have not proven useful for addressing the questions of number of components or length of occupation(s) at the site. The Ripley Site ceramics are very similar to those of the Niagara Frontier. As Engelbrecht has noted in Chapter 5, these ceramics do not exhibit a high degree of variability, and problems exist in associating ceramic assemblages with late prehistoric versus protohistoric and early historic contexts. There are few radiocarbon dates for sites in western New York, so assignment of sites to time periods relies heavily on presence/absence, amount, and kind of European trade items.

Mortuary-related use of the site during the Contact Period is certain, due to the European trade material recovered from a few graves. As noted in Chapter 4, Johnson et al. (1979) would place occupation at Ripley as late as A.D. 1625, based on trade beads, while Fitzgerald and Ramsden (1988) have placed the occupation at A.D. 1550-1580, based on the copper and brass trade items.

The radiocarbon dates resulting from the 1988 investigations, which were available at the time of writing, raise more issues about use-span and number of components at the Ripley Site. As noted in Chapter 4, these thirteenth- and fourteenth-century dates were obtained from charcoal samples from a charred post and charcoal from a post mold within a linear pattern of post molds. No objects of European origin were found in the vicinity of these features, but the recovered artifacts are well within the range of those found by the other investigators in both general excavation and mortuary contexts. Due to problems in obtaining reliable radiocarbon dates for the early Contact Period, other independent techniques need to be used to support or refute these dates, but they cannot be summarily dismissed.

The incongruence of the trade items and radiocarbon dates leads us, like Schock, to suggest that the Ripley Site is multicomponent. The major period of site use and the occupation span are issues yet to be resolved. The circumstances at the Ripley Site, however, do not suggest long periods or gaps in occupation because the non-European artifact assemblages represented in the funerary objects appear homogenous and quite comparable to those found in non-funerary contexts. In any case, the occupational history of the Ripley Site clearly is not as simple as Parker thought. The site appears to have been used during late prehistory as well as the early Contact Period, but which component includes the majority of features is not obvious. Continuous use of the site over nearly two centuries also is a possibility. These issues can be addressed only by obtaining more absolute dates from a variety of contexts and by refining the regional ceramic chronology. A variety of dating techniques and artifact collections from modern systematic excavations, especially from closed contexts, are needed to resolve the chronological problems at the Ripley Site. Nonetheless, the available information does suggest use of the site over a long time span, beginning much earlier than the late sixteenth/early seventeenth centuries, and such long-term use is inconsistent with Parker's interpretation.

Were the Occupants Erie?

The discussion of the Erie in Chapter 2 demonstrates that information about this group(s) is scant and that there are no firm correlations between archaeological assemblages and ethnic groups that lived along the southern Lake Erie shore during the Historic Period. The prehistoric dates for the site make any such correlations even more problematic. Thus, Parker's correlation of the Ripley Site with the Erie can be neither supported nor refuted.

Although the issue of the ethnicity of site's occupants currently cannot be resolved, it is possible to begin to model the society that used the Ripley Site.

Work with the social dimensions of the mortuary practices (Chapter 9) does suggest that the society that used the Ripley Site for burial purposes was organized very much like the "tribal" societies (Service 1962) of the Historic Period in the Great Lakes region. Through comparison with data from early historic Seneca sites, a more detailed model specific to the Ripley population begins to emerge.

These interpretations of societal organization suffer from lack of understanding of site chronology, but as discussed in Chapter 9, such problems are inherent to mortuary studies because of the length of time involved in forming a sample of sufficient size for analysis. The present problem in understanding possible multiple components at the Ripley Site means that the possibility that social changes occurred must be considered, but as noted above, there are no easily recognized discontinuities or breaks in occupation of the site. As O'Shea (1984:30) has implied, the most likely result from considering the social dimensions of the mortuary practices in total is that the recognized behavioral patterns essentially represent dominant trends. Such a "generic" characterization of the Ripley society(-ies) must suffice until finer chronological distinctions can be made.

While there is some evidence for ranking in the Ripley mortuary population, there is little or no evidence for social differentiation based on ascription. Instead, an individual's age, sex, and presumably personal achievement were important factors in determining mortuary treatments, and inferentially, for gaining social prestige. Funerary objects more often are associated with adults than with subadults, and specific categories of funerary objects correlate with age group and sex. Cluster analyses, designed to group burials similar in terms of body positioning and artifact associations, further indicate that a few individuals received mortuary treatments that were distinctive, especially in the variety of associated objects, from the majority of individuals. These distinctive burials all are adults, and both sexes are represented, but most are males. The lack of a normal demographic profile for this distinctive group argues against their ascribed status (Brown 1981).

Plots of burial locations within the site indicate that there is no discernible spatial patterning of the distinctive adult burials. Recognizing such patterning is not possible at present because the relationship of burial positioning to structures or other types of features cannot be addressed with the available information.

A comparison of the observed mortuary practices at the Ripley Site with those of the Contact Period and the early historic Seneca (Sempowski 1987; Sempowski et al. 1988) indicates considerable differences in burial positioning, funerary-object diversity, and association of various categories of artifacts with the sexes. A striking difference between the mortuary practices at the Ripley Site and Seneca sites is a lack of evidence at Ripley for the disruptive processes associated with European contact (Sempowski et al. 1988). The low frequencies of multiple burials and European trade goods at Ripley suggest less direct contact with Europeans for the Ripley population than for the sixteenth-century Seneca.

An important question that cannot be addressed adequately with current information is the relationship of the burial population represented at the Ripley Site to a larger society(-ies). If mortuary ceremonialism was indeed the main focus of activities at the Ripley Site, it is possible that the site is a communal burying ground and that the population at Ripley is representative of an entire society (minus a portion of the young adult males; see Wilkinson, Chapter 8), rather than one community. Nonetheless, the ethnic identity of this society remains unknown, and none of the main canons of Parker's interpretation is an easy fit with the available information about the site.

THE RIPLEY SITE AS A MORTUARY SITE: IS IT PLAUSIBLE?

Development of a model of the material correlates of Northern Iroquoian mortuary ceremonialism is critical for assessing whether the archaeological record at the Ripley Site reflects such activities. Although imperfect in their detail and coverage, ethnographic and ethnohistoric literature from the region provide information sufficient for developing a very generalized model. Three basic types of mortuary-related ceremonies are reported for the Northern Iroquois. The first is the individual funeral ritual; the second is a general, periodic propitiation of the dead; and the third is a condolence ceremony for mourning dead chiefs and installing new ones (Beauchamp 1907:402-404; Fenton and Kurath 1951). The latter ceremony, according to Fenton (1978:319), is a combination of older customs that has become "a great ritual drama." The older, more general propitiation of the dead is an element of the condolence; thus, the specific elements of the condolence are not considered here for model-building purposes.

The belief that ghosts or spirits of the dead are present at mortuary ceremonies is strong in Iroquoian culture. Individual funerals seek to help the soul travel to the next world. The corpse is dressed in special clothes, the house is cleaned, and mirrors and reflecting objects are covered so that no one will be frightened by seeing the ghost in them. Special foods are prepared and set out for the deceased and for a feast that is held several days after the death. The actual interment takes place during the period before the feast. Personal effects of the deceased are redistributed at the feast, and some goods may be interred with the body (Fenton and Kurath 1951; Heidenreich 1978:374; Tooker 1978:462).

Ceremonial propitiation of the dead, known as the "Feast of the Dead" or "Ghost Dance," is a well-known and recorded Iroquoian mortuary ceremony with many variants practiced by groups throughout the region. The best known is the previously mentioned Huron version that was recorded in the seventeenth century. This elaborate ceremony involved disinterment of individual burials and reburial in a communal grave. A mound was built over the grave and a ring of posts erected around it. The ceremony usually included several villages and was held at a special, remote location. Goods were interred with the dead as well as redistributed among the living, and the ceremony served to reaffirm tribal ties as well as to honor the dead (Heidenreich 1978:374-375).

The Feast of the Dead survives today as a semi-annual ceremony in all conservative Iroquois communities. The purpose of the feasts is to placate the dead with periodic offerings, today in the forms of tobacco burning, food and other goods (usually cloth), song, and dance. The dead are believed to be present at the ceremonies to receive various sacrifices and to participate in the dances and songs (Fenton and Kurath 1951). The large, all-night communal feasts form part of the annual cycle of ceremonies and are usually held after the harvest in the fall and in the spring when the sap rises. Smaller, private versions of the feast may be held for individuals or families as healing rituals during any season (Fenton and Kurath 1951).

Women are the ceremonies' primary organizers and participants, and the female officials are elected for life in some groups. Men assist the women with the preparations, including cooking of special foods and preparing and tending ceremonial fires. The ceremonies are now held in the community longhouse. Fenton and Kurath (1951) recorded both Cayuga and Onondaga versions of the communal ceremony at Six Nations Reserve, Canada, in the 1940s. Each ritual included prayers, social dances, feasting, burning of offerings (tobacco), distribution of goods (cloth), and use of a special large drum. The distribution of goods is made to the living who receive the materials for the dead.

Fenton and Kurath (1951:143) note distinct parallels with the modern ceremonies and the older Huron one. How much of the modern practice is a result of the religious revivalism of the eighteenth century, and possibly based on accounts of the Huron ceremony, is unclear. Yet, the widespread practice and importance of the communal Feast of the Dead to Iroquoian peoples suggests that a form of the ceremony was practiced in antiquity by groups in addition to the Huron; yet, it is clear from both the ethnohistoric and archaeological records that not all these groups practiced communal reburial in ossuaries.

A communal "Feast of the Dead-like" ceremony appears to offer the best basis for developing a model for activities that would have taken place at the Ripley Site, if the site's main purpose indeed was mortuary-related. Reburial of the dead obviously was not done at the site, since the vast majority of burials are primary interments. Given the strong Iroquoian belief that the dead are present at such ceremonies, it is conceivable that an alternate version may have involved conducting rituals at an established, communal cemetery. Such a practice would be a variation on the same theme as the Huron custom, but perhaps a different group's own version. A particularly interesting consideration in this regard is the lack of burials at late prehistoric/protohistoric habitation sites in the Niagara Frontier region (Engelbrecht 1993). This pattern is a significant departure from the early historic Seneca villages with their large, adjacent cemeteries (cf. Wray et al. 1987) and is certainly compatible with use of specialized cemetery sites away from the village. The earth ring at the Ripley Site perhaps was analogous to the mound and encircling posts erected at the Huron cemetery in that the Ripley earth ring marked the cemetery location.

Given these possibilities, other activities that may have taken place at the Ripley Site include singing and dancing, ritual offerings to the dead, preparation and consumption of special foods, and redistribution of goods. We may also expect that these ceremonies were regularly conducted at certain times of the year (e.g., spring and fall) and, given their duration, that some type of shelter(s) probably was necessary. Table 10.1 summarizes these various activities and lists possible archaeological correlates. None of these attributes in themselves provides prima facie evidence that a site was used for mortuary ceremonialism, but an aggregate would constitute a strong argument. Some of the correlates can partially be examined with existing data from the Ripley Site.

Special Facilities and Presence of the Dead

As discussed above, the earth ring may have served to mark the cemetery. Although the information about structures is scant and flawed, the small buildings reported by Harrington, Parker, and Conklin do not compare favorably with domestic longhouses. The large number of graves certainly indicates a large amount of mortuary activity. As Wilkinson has pointed out in Chapter 8, the number of burials seems incongruent with the size of the site, the lack of evidence for numerous structures, and the lack of extensive midden deposits.

Periodic Use

The provenience and recovery problems posed by the existing collections preclude detailed seasonality studies at this time. The site's physical setting suggests use during the warmer months. Strong winds blow off Lake Erie in the winter and make it bitterly cold in comparison to the pleasant summer lakeside conditions. Digging of graves with stone and wooden tools certainly is an activity that would not have been done during times of the year when the ground was frozen.

Evidence of rebuilding and repair of structures, especially if these are not typical domestic structures and not constructed to withstand harsh winters, also would support periodic site use. Existing information is insufficient to explore this possibility.

De Boer (1988) has correlated use of subterranean storage with seasonal or periodic abandonment. The various investigators noted numerous pit features at the Ripley Site, but descriptions are either vague or nonexistent. It is possible that cache pits at the site may have been used to store needed routine items, such as large food-preparation tools. The large mortar discovered by Parker in a pit feature is a possible example. More information about the pit features is needed to assess their functions.

Special Foods

Consumption of special foods is an activity associated with many types of ceremonies in most cultures. Subsistence refuse that includes a very

TABLE 10.1. CEREMONIAL ELEMENTS AND POSSIBLE ARCHAEOLOGICAL CORRELATES FOR GENERALIZED "FEAST OF THE DEAD."

Ceremonial Elements	Possible Archaeological Correlates
1. Special facilities: cemetery marker (?); shelter(s)	1. Earthwork, other marker (?); structure(s), but probably not typical longhouse
2. Dead are present	2. Graves
3. Periodic use, perhaps seasonal (spring and fall?)	3. Seasonal-use indicators in subsistence remains; multiple, short-term occupations perhaps evidenced by rebuilding and repair of temporary structures, caching of goods
4. Special foods are consumed	4. Restricted range of floral and faunal refuse assemblages; vessels for food consumption
5. Singing and dancing	5. Cleared area, possibly within structure
6. Tobacco burning	6. Small fires; charred tobacco seeds
7. Gifts to dead	7. Special craft or food items; possibly left near graves
8. Redistribution of goods	8. "Lost" items that may include a variety of finished objects and raw materials; possible caches for temporary storage of such goods
9. Food preparation	9. Cooking hearths and vessels; tools related to food processing

restricted range of species, as compared with those available in the area and commonly eaten by humans, is one possible archaeological correlate for consumption of special foods at the site. Faunal refuse bone that represents selective cuts of meat may also indicate special foods. Another possible means for identifying special foods is analysis of residues on pottery sherds.

Evidence for plant use at the Ripley Site is scant in the older collections, since flotation techniques were not employed. Thus, it is currently not possible to assess the range of species represented at the site. Previous investigators did recover numerous charred corn cobs, but corn was an everyday food that may also have been consumed at ceremonies.

The faunal assemblage does suggest use of a limited range of species and little use of the presumably most readily accessible species. Aquatic resources do not seem to be a significant component of the faunal assemblage. Fish represent less than six percent of the animal bones, which is surprising given the site's location on the Lake Erie shore. The Huron taboo against association of fish with the dead (Tooker 1991:133,136; Trigger 1969:106) is an interesting practice to recall in considering the Ripley faunal data.

The animal bone indicate use of mainly large-bodied, mammalian taxa, with little use of small-bodied taxa such as birds and rodents. The high representation of large taxa in the faunal assemblage may indicate that provisions were being brought to the site, since small taxa are not normally very practical for such purposes. Samples collected from more controlled contexts using modern recovery techniques are needed to substantiate these observations, and more work needs to be accomplished to determine the body portions or meat cuts that were used at the site.

Several SUNY at Buffalo graduate students, under the direction of Zubrow (Fie et al. 1990), conducted a chemical analysis of food residues in ceramic vessels from nine sites in western New York, including four sherds from unknown contexts collected at the Ripley Site by amateurs in the 1960s. The residues on the Ripley sherds are anomalous in that their chemical composition is not compatible with the lake plain soils in the vicinity of the site. Residues on the sherds from the other eight sites were chemically similar to the sites' soils. The Ripley residues are more compatible with soils of the Allegheny Plateau to the south and east. We do not know if these residues represent cultigens or wild plants, but the residues do indicate that the food stuffs in the pots were either cultivated or gathered some distance away and transported to the Ripley Site. If the residues derive from maize, it is unclear why the fields would be located at such a distance, since the site is situated on the prime horticultural soils of the lake plain. Assuming that the residues represent gathered plants seems more plausible. Because the Ripley residues are unique among the tested sites, it is tempting to suggest that use of plants that grew some distance away might indicate preparation of special dishes.

Space for Singing and Dancing

An open or cleared area would be needed for dancing associated with mortuary ceremonies. Such an area could either be outdoors or within a structure, but unless the same area consistently was used for these purposes, identification in an archaeological context would be difficult. For example, if dances were held in temporary shelters built specifically for ceremonies, rebuilding of these could obscure cleared areas.

Tobacco Burning

Propitiation of the dead with tobacco could be evidenced by small hearths or fires and/or charred tobacco plant parts. Several of the previous investigators report small "grave fires" at the Ripley Site. These small hearths occurred over or near the head of some burials. No content information exists for these features. At the time of this writing, analysis of the flotation samples from our recent excavations is ongoing, but Bodner (1989) has identified tobacco seeds from one large pit feature near the edge of the bluff on the site's northern periphery.

Gifts to the Dead and Redistribution of Goods

One possible explanation for the finely crafted tools and ornaments found in non-grave contexts at the Ripley Site is that these were offerings to the dead that were left at the site as well as items that were brought for redistribution, but were "lost" at the site over the years. Modern systematic collections with good contextual information are needed to address this issue.

Food Preparation

Food preparation may or may not have been done at the actual site of the mortuary ceremonies. Consideration of food preparation is important as it is the one routine, domestic activity that likely would have been done consistently in conjunction with the ceremonies, although as noted above, special foods may have been prepared. Evidence for food preparation would include the presence of cooking vessels in the ceramic assemblage and possibly a large communal cooking hearth.

A special-purpose, mortuary-ritual orientation would thus not preclude performance of routine living activities during the span of occupation of the site (e.g., McGimsey and Wiant 1986). Facilities for ritual use and those for general living purposes may have been spatially segregated, and it is possible that one function of the earth ring may have been to demarcate such areas. Construction activities for possible shelters, excavation activities for earthwork construction, and grave-digging probably required manufacture of expedient tools and maintenance of more formal tools, but other activities such as tool manufacturing, hide processing, and leather-working, would not be indicated as significant components of the suite of tasks performed at the site.

Plan for Continued Research

The exploratory studies in this volume do not provide an adequate test of the model, but the work to date is highly suggestive that mortuary ceremonialism could have been the primary function of this earthwork site. Several focused and integrated sets of analyses, framed in the context of expectations about the kinds of activities connected with mortuary ceremonialism, are needed to better delineate what *was* done at the Ripley Site, and to resolve the chronological problems. These analyses include studies of artifact assemblages from well-documented contexts, including a functional study of the ceramic assemblage; analyses of subsistence-related assemblages (including botanical materials) from provenienced contexts; studies of structures and features to determine their functions; dating of a variety of samples from well-provenienced contexts; and integration of these studies into an analysis of the nature, contemporaneity, and function of activity areas.

The data necessary to perform these analyses cannot be obtained from the existing Ripley Site collections because of deficiencies in recovery and recording techniques. Further field investigations using modern recovery techniques are necessary for collecting information appropriate for generating needed data. Specific objectives to be addressed in future fieldwork include:

1. Reconstruction of the site plan with more accuracy and detail so that the nature of activity areas at the site can be assessed
2. Assessment of trends observed in artifact types and patterns of use based on assemblages collected by less biased recovery techniques
3. Assessment of the nature of the structures and the types of activities conducted in structures
4. Assessment of the nature of seasonality of site use and the types of subsistence activities possibly undertaken at the site
5. Assessment of the range of activities represented by pit features
6. Resolution of use-span and dating problems through collection and analysis of appropriate samples from well-provenienced contexts

The Larger Perspective

The first step toward integrating the Ripley Site into a regional context is obviously to understand the site itself. The function of the site must be as carefully assessed as its chronological placement. If the site's function as a place for mortuary ritual is confirmed, this result will have major implications for development of models of regional settlement and social integration patterns that are specific to the Chautauqua/Allegheny portion of the southeastern Lake Erie Basin.

The degree to which a reinterpretation of the function of the Ripley Site as primarily mortuary-related will impact interpretations of regional prehistory is most apparent when one considers how basic the assumption that earthwork sites are fortified villages is to current models. Definition of the Ripley Site as a special-purpose, ceremonial site would require that assumptions about regional population size (as suggested by numbers of major "villages") and about the defensive nature of all the earthworks and the implied degree of intertribal conflict be reconsidered.

Assumptions that the earthworks served a defensive function has informed ideas about population pressure and intertribal conflict in the region prior to European intervention. The fortifications and implied conflict generally are seen as a product of a chain reaction throughout late prehistory of increased population and competition for prime agricultural soils, brought about as a result of increased sedentism and dependence on horticulture (Brose 1976c, 1978:580; Johnson, Richardson, and Bohnert 1979; White 1963a; Widmer and Webster 1981:3:71). Post-contact intertribal warfare is well documented and is viewed by some as an extension of this process (Stothers and Graves 1983). Trigger (1981:34) has warned, however, that the population density in the lower Great Lakes region was low in relation to the amount of fertile land and has thus ruled out pressure of this sort as a explanation for increased competition. The fact that the function of the earthwork sites is poorly understood makes gaining a realistic understanding of the population density in the Chautauqua/Allegheny region a perplexing problem, since it is currently not possible to make sense of late prehistoric and early historic regional settlement patterns.

Establishment of the function of the Ripley Site also would make headway toward developing a regional model for settlement/subsistence systems during late prehistory and protohistory in the Chautauqua/Allegheny area. Developing such a model is an important aspect of understanding past cultural dynamics, the major goal of the Ripley Archaeological Project. If the site is found to be a specialized ceremonial site or other seasonal encampment, this result will suggest the nature of other types of sites that may be expected in the area. Locations and types of related habitation sites are especially an issue because no other major sites believed to be contemporary with Ripley are known in the immediate vicinity. Thus, questions regarding population movement and aggregation become significant problems for placing the Ripley Site in a regional context and have serious implications for current models.

Engelbrecht's analysis of the ceramics (Chapter 5) suggests one postulate for the Ripley Site's apparent isolation. He found a high degree of similarity between the Ripley Site ceramics and those from the Newton-Hopper Site in the Niagara Frontier. The two sites are separated by a distance of approximately 109 km. This similarity led him to suggest a special relationship between the Ripley and Newton-Hopper sites, possibly involving population movement. The reason for such a movement, its directionality, and possible relationship to site function, are presently unclear.

The environmental setting of the Ripley Site suggests another hypothesis for its place in a regional settlement system and its social context. The nearby juxtaposition of two contrasting environmental zones, the rugged Allegheny Plateau with its diverse floral and faunal populations, and the level lake plain with its more easily cultivated soils and longer growing season, begs questions about seasonal movements, the degree of sedentism, and of reliance upon maize horticulture of the resident population(s) prior to European contact. An interesting observation possibly related to subsistence strategies (see Chapter 8) is the lack of evidence in the Ripley human skeletal series for the chronic disease-malnutrition spiral common to many prehistoric populations, especially horticultural ones. The lack of this condition could signal either that the population was very successful in producing a horticultural surplus for the long winter months, or that horticultural products were not necessary for adequate sustenance. These observations raise issues similar to those raised by Marian White (1963a) for populations in the Niagara Frontier prior to European contact. She suggested a pattern of semi-sedentary, seasonal movement.

LOOKING FORWARD

The Chautauqua/Allegheny portion of the Lake Erie Basin would seem to be a natural laboratory for examining questions related to interaction spheres between the resident populations, neighboring Iroquoian groups, and the late cultures of the Upper Midwest, but it is clear that a better understanding of the Chautauqua/Allegheny area itself is needed before such problems can be meaningfully addressed. Archaeological assumptions borrowed from other areas must be carefully examined before being adopted and applied to this "borderland" region.

Systematically collected survey and excavation data, using modern recovery and sampling techniques, will be crucial in doing this. This volume demonstrates that older collections, even those representing the worst-case scenario of unsystematic excavation using non-professional techniques (like many of the Ripley Site collections), should not be ignored, but that such collections have their limitations.

In the not-too-distant future, museum collections will be primary sources of data for many types of archaeological research. The continuing destruction of the archaeological database through modern development is making the possibility of retrieving new information from new excavations the rare, instead of the usual, situation. The test excavations conducted in 1988 at the Ripley Site by the Ripley Archaeological Project did show that despite the extensive previous excavations, a substantial number of features and deposits remain intact.

That portions of this site remain intact and thus available for continuing research is indeed a fortunate situation. It behooves us all to insure that data gathered for future research are collected using the best techniques currently available and that the collections are curated to avoid unnecessary data loss. Otherwise, the story of sites like Ripley could end here. Instead, happily, this volume represents a new beginning at reanalyzing the Ripley Site.

APPENDIX A

CERAMIC CODE AND DATA

CERAMIC CODE[1]

Column 1

Blank

Columns 2-3

The site

Columns 4-5

The provenience of the vessel within the site. These numbers are assigned by the investigator. They generally refer to a large area of the site. If information on internal provenience is not available, the vessel is coded as 00 in Columns 4 and 5.

Columns 6-7

The number of rim sherds constituting the vessel being recorded

Columns 8-9

The combined width of the rims to the nearest cm

Columns 10-11

The maximum rim height to the nearest cm

Column 12

Completeness

The most complete sherd is recorded.

1	non-collared sherds (must be at least 2 cm high)
2	complete to the base of the collar but not beyond
3	complete to the base of the collar and up to 2.5 cm and beyond
4	complete to the base of the collar and more than 2.5 cm below this
5	whole pot (or nearly so)

Column 13

Encrustation

0	absent
1	present

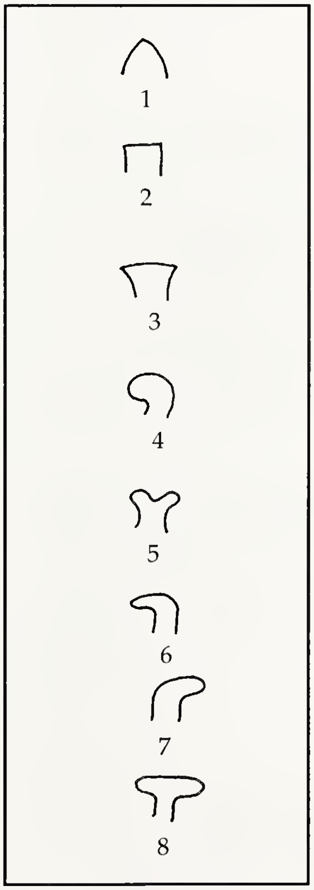
Columns 14-15

An estimate of vessel diameter in cm

Columns 16-17

Lip Shape

1	pointed
2	flat
3	thickened
4	thickly rounded
5	cleft
6	extending out
7	extending inward
8	extending in and out
9	variable



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[1] This code provides a key to Tables A1 and A2.

Columns 18-21

Lip Surface Decoration

Two different lip surface designs can be recorded. Columns 18 and 19 are used if only one design element is present. If there are two design elements, the innermost one is recorded in Columns 18 and 19, and the outermost one is recorded in Columns 20 and 21.

0	plain
1	incised vertical lines
2	incised oblique lines sloping to the left
3	incised oblique lines sloping to the right
4	one incised horizontal line
5	two or more incised horizontal lines
6	cross-hatched lip surface
7	corded
8	superimposed vertical and horizontal incised lines
9	superimposed vertical and oblique incised lines
10	superimposed horizontal and oblique incised lines
11	scalloped surface
12	notches across surface, regularly spaced
13	shallow wide notches across surface
14	irregularly shaped notches
15	shallow notches which are irregularly spaced
16	deep notches
17	punctates
18	sporadic oblique incisions
19	incision which continues onto rim
20	brushed (horizontal)
21	brushed (sloping to the right)
22	brushed (sloping to the left)
23	intermittent notches
24	notches only above castellation
25	incised opposed triangles
26	alternating bars of vertical and horizontal incision
27	dentate stamping
28	fingernail incision
29	horizontal lines between oblique or vertical lines
30	reverse of 29
31	stamped

Column 22

Interior Contour of Rim

1	convex
2	straight
3	concave
4	variable or indeterminate

Columns 23-30

Inside of Rim

See Columns 37-52; same list and procedure

Column 31

Outer Edge of Lip

0	plain
1	short vertical incision
2	short oblique incision sloping to the left
3	short oblique incision sloping to the right
4	vertical notch
5	notch sloping to the left
6	notch sloping to the right
7	evidence of flattening of the lip
8	incisions sloping both left and right
9	oval punctates

Column 32

Inner Edge of Lip

See Column 31; same list

Column 33

Exterior Contour of Rim

See Column 21; same list

Column 34

Relation of the Collar to the Neck

1	well defined
2	overhanging appliqué
3	poorly defined
4	appliqué
5	(blank)
6	no collar, excurvate shape
7	no collar, straight shape
8	no collar, incurvate shape

Columns 35-56

Height of the Collar (in mm)

Columns 37-52

These columns record the design elements and techniques used on the outside of the rim. Designs have been broken down into minimal or near minimal units. Three design elements may be recorded in order from the lip down. Spaces for recording the technique of execution of the particular design element precede the recording of each design element. Thus, the technique of execution of the uppermost design element is recorded in Columns 37-38. The actual design element is recorded in Columns 39-40. The technique of execution of the second design element is recorded in Columns 41-42, the second element is recorded in Columns 43-44, etc. A fourth design element that is integrated into the preceding elements, such as punctations between lines or ladder-plait, is recorded in Columns 51-52. Approximate vertical spacing is indicated by leaving columns blank.

Techniques

1 regular incision
2 regular depth, thin width incision
3 regular depth, broad width incision
4 deep depth, thin width incision
5 deep depth, regular width incision
6 deep depth, broad width incision
7 shallow depth, thin width incision
8 shallow depth, regular width incision
9 shallow depth, broad width incision
10 fingernail incision
11 interrupted linear (push-pull, stab and drag)
12 cordmarked
13 cord-wrapped-stick impressed
14 fabric marked
15 dentate stamped
16 rocker stamped
17 pseudo-scallop shell
18 punctates
19 linear stamped (grooved paddle)
20 stamped
21 cordmarkings smoothed over
22 cord-wrapped-stick impressed smoothed over
23 incision variable in depth but wide width is constant
24 regular width incision but deep at lip and shallow at base of collar
25 brushed
26 incision shallow in depth, variable in width
27 very broad and shallow incision
28 thin incision deeper at base than lip
29 incision variable in width and depth
30 wavy lines
31 incision and cord-wrapped-stick impressed
32 incision and interrupted linear

Design Elements

0 plain
1 single horizontal line
2 double horizontal line
3 multiple horizontal lines
4 intermittent vertical or oblique lines
5 vertical lines
6 oblique lines sloping left
7 oblique lines sloping right
8 short vertical lines (less than 1 cm)
9 short lines sloping left
10 short lines sloping right
Designs 11-18, see Figure A1
19 horizontal and vertical lines
20 horizontal and oblique lines sloping left
21 horizontal and oblique lines sloping right
22 horizontal and oblique lines sloping left and right
Designs 23-34, see Figure A1
Designs 35-38, see Figure A2
39 oblique lines left and right and horizontal and vertical lines
40 multiple oblique lines
41 chevron open on top
42 chevron open on bottom
43 chevron open to the left
44 chevron open to the right
45 herringbone
Designs 46-61, see Figure A2
Design 62, see Figure A3
63 row of circular punctates
64 row of elliptical punctates
65 row of crescentic punctates
66 row of square or rhomboid punctates
67 reed punctates
68 bossing
69 vertical row of punctates
70 double vertical row of punctates
Designs 71-89, see Figure A3
Designs 90-96, see Figure A4
97 effigy
98 unpatterned

Columns 53-54

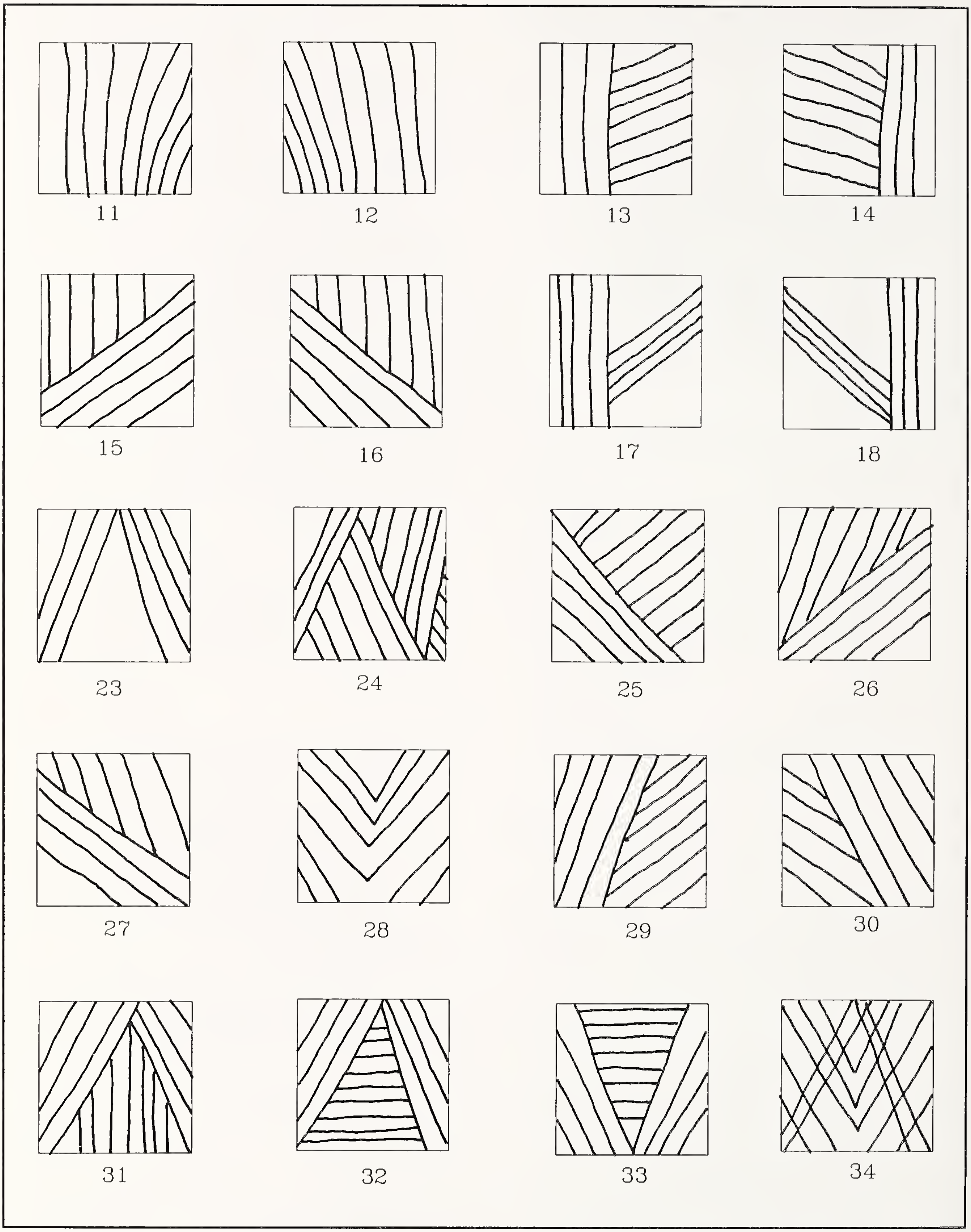
Treatment of the Bottom Edge of the Collar

0 plain
1 vertical gashes
2 oblique gashes sloping left
3 oblique gashes sloping right
4 vertical notches
5 notches pointing left
6 notches pointing right
7 round punctates
8 oval punctates
9 square or rhomboid punctates
10 crescentic punctates
11 design from collar continues
12 incisions
13 small deep punctates
14 removed ovals
15 pinched
16 fingernail

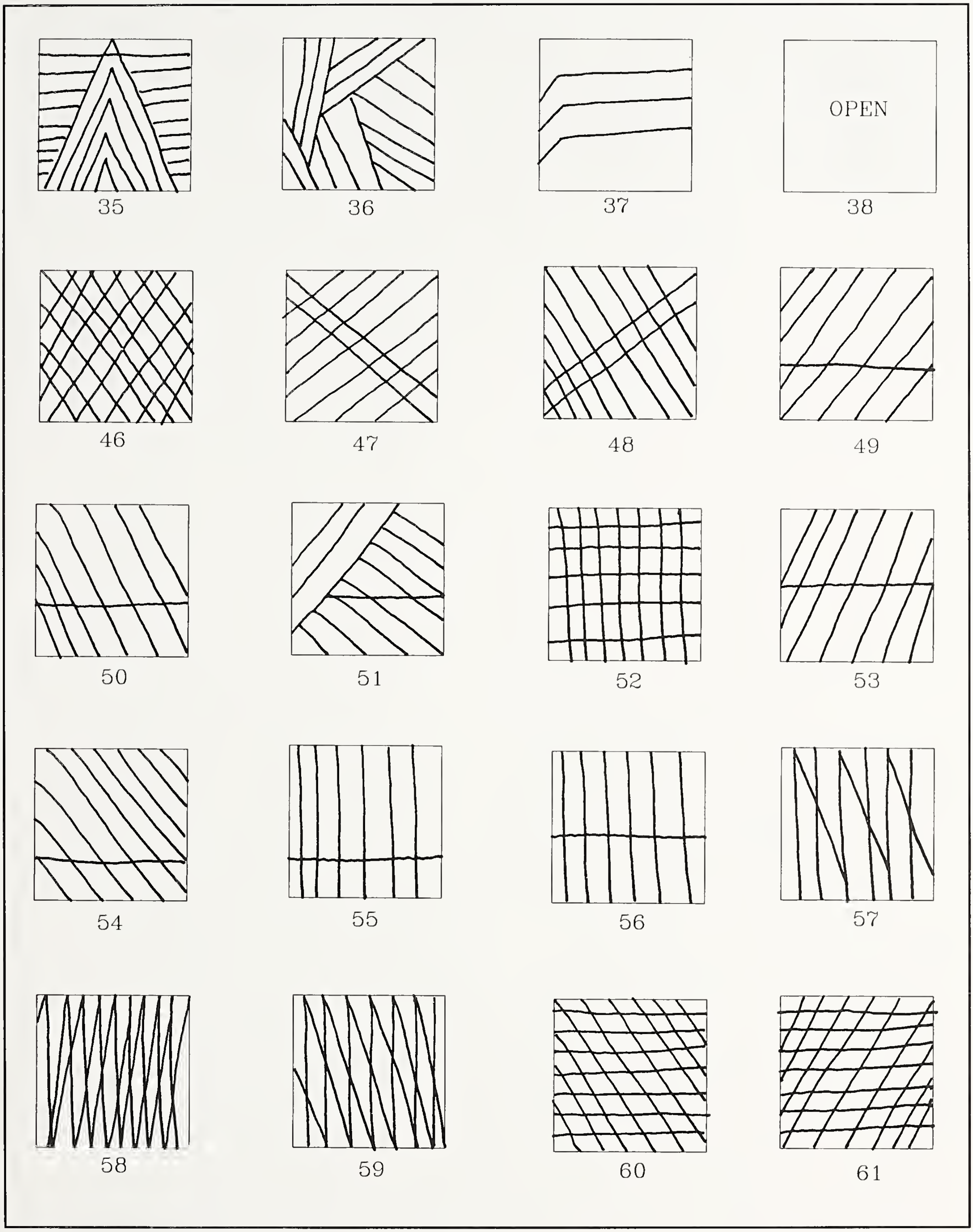
Columns 55-56

Form of the Bottom Edge of an Appliqué Collar

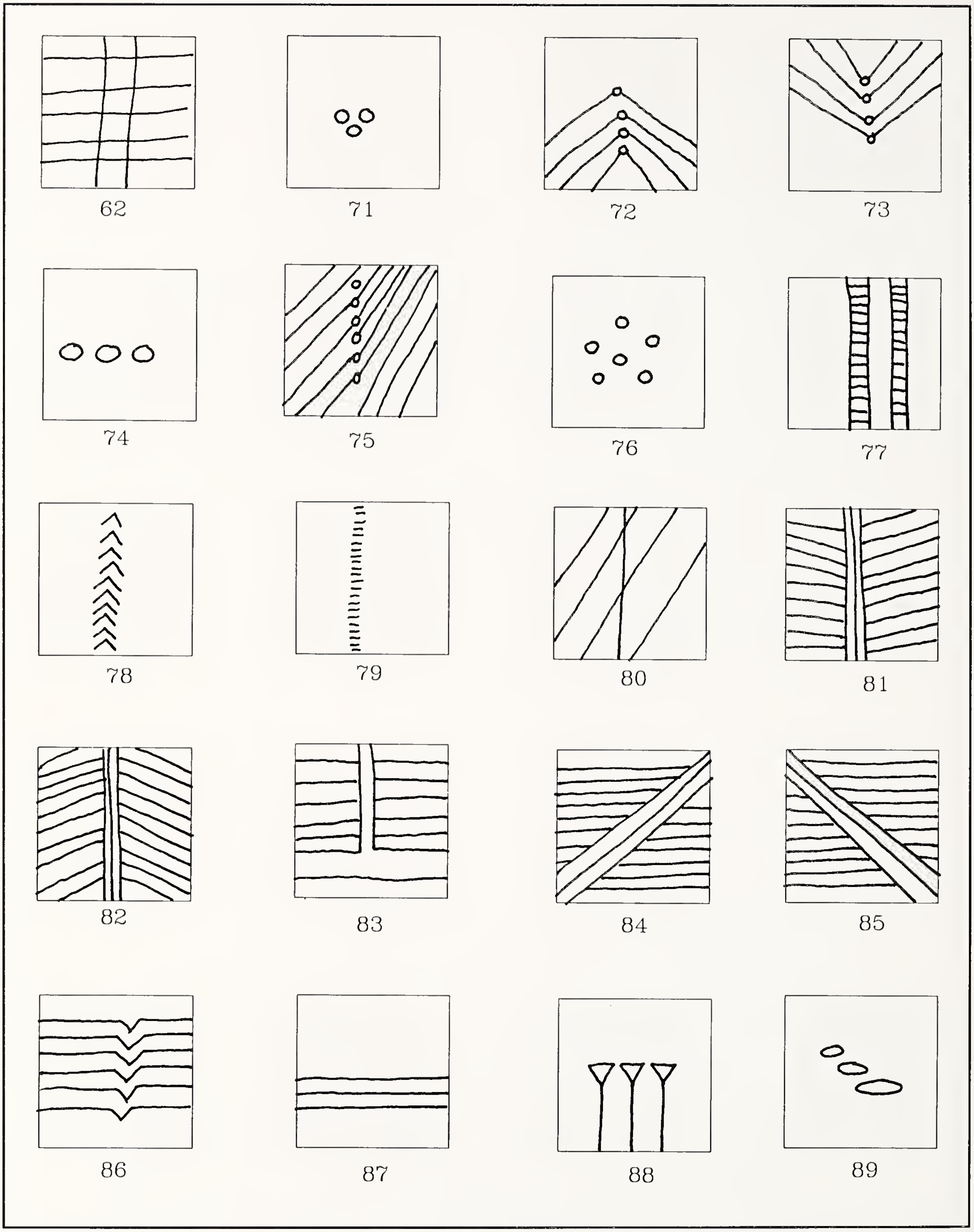
0 not an appliqué collar
1 vertical triangular barbs
2 triangular barbs pointing right



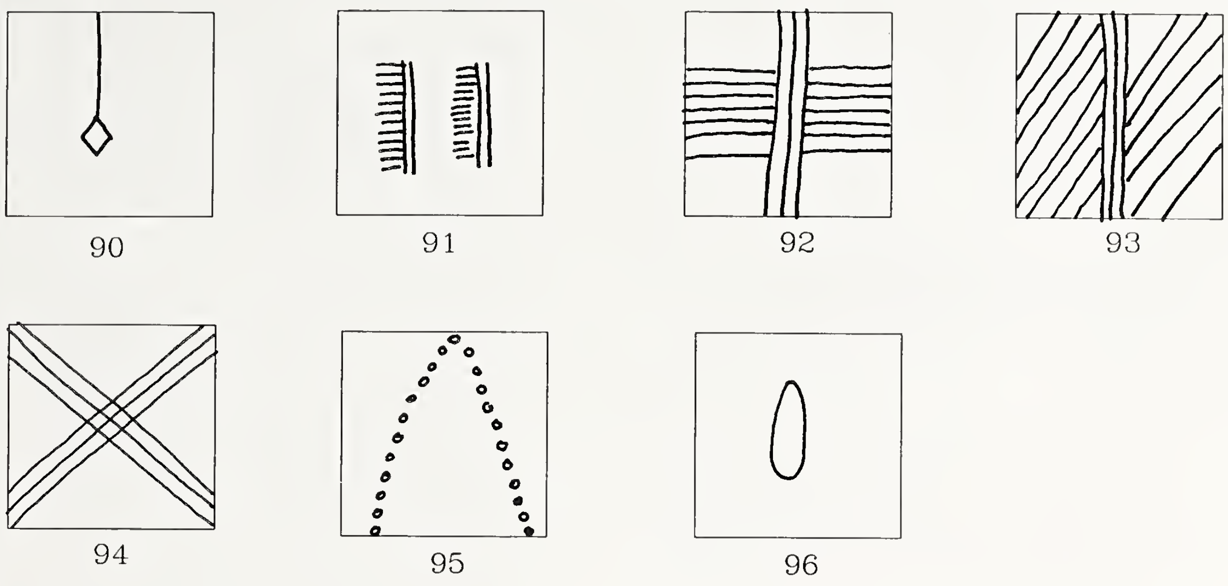
A.1 Design elements



A.2 Design elements



A.3 Design elements



A.4 Design elements

3 triangular barbs pointing left
4 frilled or crenelated barbs
5 removed ovals
6 gouges sloping right
7 gouges sloping left
8 vertical gouges
9 scalloped barbs

Columns 57-64

Design Elements below the Collar and the Technique of Execution of These Elements

See Columns 37-52; same list and procedure

Column 65

Castellations

0 no castellation[2]
1 flat
2 bifurcated
3 pointed
4 rounded
5 multiple
6 gently rounded
7 curvate changes as if there were a castellation
8 treated like a castellation, but there is no rise in rim or change in curvate

Column 66

Castellation Information

0 no castellation
1 design is the same as design on the rest of the collar
2 design is different from design on the rest of the collar
3 design is different from design on the rest of the collar and from the design on the shoulder of the vessel
4 design is different from design on the rest of the collar but similar to design on shoulder of the vessel
5 design is similar to both collar design and design on the shoulder
6 design is similar to collar design but differ ent from design on the shoulder
7 only castellation represents vessel
8 castellation is inferred through curvature

Columns 67-74

Design Elements under Castellation

See Columns 37-52; same list for Design Elements. Techniques of execution are not recorded.

Columns 75-76

Ceramic Type

0 indeterminate
1 Bainbridge Linear
2 Black-Pound Necked-Bristol Linear (see Bainbridge Linear)
3 Castle Creek Incised Neck (see Garoga Incised)
4 Cayuga Horizontal
5 Change Incised
6 Cord Marked Rim
7 Cornear
8 Cromwell Incised
Dansville Corded (see Kelso Corded)
9 Deowongo Incised
10 Depressed Lip Group
11 Durfee Underlined
12 Dutch Hollow Notched
Fonda Incised (see Garoga Incised or Martin Horizontal)
13 Garoga Incised
14 Genoa Frilled
15 Goodyear Corded (also Goodyear Lipped)
16 Gross and Compound Decorated Interior Group
17 Horizontal and Vertical Ladder Plait Group
18 Huron Incised
19 Ithaca Linear
20 Kelso Corded
Lanorie Corded (see Kelso Corded)
21 Lanorie Crossed
22 Lanorie Crossed Lip
23 Lanorie Mixed
24 Lawson Incised
25 Lawson Opposed
26 Long Point Horizontal
27 Long Point-Seneca Notched
28 Low Collared Horizontal Group
29 Martin Horizontal
30 Middleport Crisscrosss
31 Middleport Oblique
32 Myer's Barbed Collar
33 Niagara Collared
34 Oak Hill Corded
35 Onondaga Triangular
36 Ontario Horizontal
37 Ontario Oblique
Otstungo Incised
38 Otstungo Notched
39 Pseudo-Huron Incised
Pound Blank (see Ripley-Pound Triangular)
Pound Necked (see Black-Pound Necked)

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[2] Unless the whole rim was recorded, there is always the possibility of a castellation.

40 Rice Diagonal
41 Richmond Incised
42 Ripley Collared
43 Ripley Corded
44 Ripley Plain
45 Ripley-Pound Triangular
46 Roebuck Low Collar
47 Sackett Corded
48 Salem Horizontal
49 Salem Lip
50 Salem Mixed Collar
51 Scalloped Lip Group
52 Seed Corded
53 Seed Incised
54 Seneca Barbed Collar
Seneca Notched (see Long Point-Seneca Notched)
55 Sidey Crossed
56 Sidey Notched
57 Sparta Dentate
58 Stamped Low Collar Group
59 Swarthout Dentate
Syracuse Incised (see Wagoner Syracuse Incised)
60 Thurston Horizontal
61 Uren Corded
62 Uren Dentate
63 Uren Noded
64 Wagoner-Syracuse Incised
65 Warminster Crossed
66 Warminster Horizontal
67 Iroquois Linear

Columns 77-78
Thickness of the Lip (in mm)

Columns 79-80
Thickness at the Base of the Collar (in mm)
If the sherd does not have a collar, then the thickness is recorded 2 cm below the lip.

ANALYTIC CATEGORIES

The attributes originally recorded were regrouped into larger analytic categories in order to compute coefficients of homogeneity and Brainerd-Robinson coefficients of agreement. In the following list, the numbers appearing to the right of the equal sign refer to attributes in the original attribute list.

Rim Shape (Interior Contour, Exterior Contour)
1 = (2,1) straight interior, convex exterior
2 = (3,1) concave interior, convex exterior
3 = (1,2) convex interior, straight exterior
4 = (2,2) straight interior, straight exterior
5 = (3,2) concave interior, straight exterior
6 = (1,3) convex interior, concave exterior
7 = (2,3) straight interior, concave exterior
8 = (3,3) concave interior, concave exterior
9 = (1,1) convex interior, convex exterior

Collar Design
1 = plain
2 = 01, 02, 03, 37, 86, or 87
3 = 04, 05, 06, 07, 08, 09, 10, 11, or 12
4 = 15 or 16
5 = 19, 20, 21, 22, 37, 39, 81, 82, 83, 84, 85, 92, or 93
6 = 23
7 = 13, 14, 17, 18, 24, 25, 26, 27, 29, 36, 39, or 40
8 = 31, 32, 33, or 35
9 = 46, 52, 58, 59, 60, 61, 62, or 94
10 = 34, 47, 48, 49, 50, 51, 53, 54, 55, 56, 57, or 80
11 = first (01, 02, or 03) and second (05, 06, 07, 08, 09, or 10)
12 = first (01, 02, 03) and second (13, 14, 7, 18, 23, 24, 25, 26, 27, 29, 30, 36, or 40)
13 = first (01, 02, or 03) and second (15, or 16)
14 = first (01, 02, or 03) and second (19, 20, 21, 22, 23, 32, 37, 39, 84, or 85)
15 = first (08, 09, or 10) and second (19, 20, 21, 25, 32, 33, 35, 84, or 85)
16 = first (08, 09, or 10) and second (01, 02, or 03) and third (05, 06, or 07)
17 = first (08, 09, or 10) and second (10, 02, or 03) and third (13, 15, 16, 18, 23, 24, 25, 26, 29, 36, or 39)
18 = first (08, 09, or 10) and second (01, 01, or 02) and third (19, 20, 21, 22, 32, 22, or 35)
19 = first (05, 06, 07, 08, 09, or 10) and second (01, 02, or 03) and third (05, 06, 07, 08, 09 or 10)
20 = 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 78 (multiple)
21 = 63, 64, 65, 66, 67, 68, 74 (single time)
22 = first (63, 64, 65, or 66) and second (01, 02, 03, 05, 06, 07, 20, 21, 23, 24 or 25) and third (63, 64, 66, or 66)

23 = first (01, 02, 03, 05, 06, 07, 15, 16, 22, 23, 24, or 25) and second (63, 64, 65, or 66)
24 = first (01, 02, or 03) and second (05, 06, 07, 14, 15, 16, 23, 24, 25, 26, or 33) and third (63, 64, 65, or 66)
25 = first (08, 09, or 10) and second (01, 02, or 03)
26 = regrouped attribute categories 11-18 plus original attribute 77
27 = 28, 41, 42, 43, 44, 45 or first (05, 06, 07, 08, 09 10) and second (05, 06, 07, 08, 09, 10). This last series may be repeated a third or fourth time.
28 = first (63, 64, 65, or 66) and second (01, 02, 03, 05, 06, 07, 23, 24, or 25)
29 = any combination of attributes with horizontal lines underneath (Durfee Underlined)

Lip Shape
1 = 2
2 = 3, 4, 5, 6, 7, 8
3 = 1, 9

Lip Surface
1 = 00
2 = 01, 02, 03, 18, 19, 25, 26, 29, 30
3 = 04, 05
4 = 06, 08, 09, 10
5 = 11, 12, 13, 14, 15, 16, 25
6 = 7, 17, 27, 28, 31

Lip Exterior
1 = 0, 7
2 = 1, 2, 3, 8
3 = 4, 5, 6, 9

Lip Interior (includes decoration inside rim)
1 = 0
2 = 1, 2, 3, 8
3 = 4, 5, 6, 9
4 = punctations, stamping, or interrupted linear on interior
5 = incised lines on interior

Collar Base
1 = 00
2 = 01, 02, 03, 11, 12
3 = 04, 05, 06, 14, 15
4 = 07, 08, 09, 10, 13, 16

Collar Appliqué
1 = 0
2 = 1, 5, 9, 4
3 = 2, 3
4 = 6, 7, 8

Castellation Information
1 = 0
2 = 1, 6
3 = 2, 3, 4

Diameter
1 = 1-6 cm
2 = 7-14 cm
3 = 15-26 cm
4 = 27-40 cm

Collar Neck
1 = 1
2 = 2, 5
3 = 3
4 = 6, 7, 8

Collar Height
1 = 1-11 mm
2 = 12-21 mm
3 = 22-31 mm
4 = 32-41 mm
5 = 42-99 mm

Lip Thickness
1 = 1-10 mm
2 = 11-42 mm

Base Thickness
1 = 1-9 mm
2 = 10-40 mm

Table A1. Ceramic Data from the State University of New York at Buffalo Collection.

Variable Number

				11	1	1	11	11	1122	2	22222223	3	3	3	3	33	3334444444444555	55	55	55566666	6	6	66677777	77	77	78
123	45	67	89	01	2	3	45	67	8901	2	34567890	1	2	3	4	56	7890123456789012	34	56	78901234	5	6	78901234	56	78	90
45	00	01	04	05	3	0	28	02	0000	3	00000000	0	0	2	3	24	0106000000000000	07	00	00000000	0	0	00000000	41	07	12
45	00	01	02	03	3	0	26	02	0000	3	00000000	0	0	1	3	15	0806000000000000	00	00	00000000	0	0	00000000	24	05	08
45	00	01	03	03	3	0	24	02	0000	2	00000000	0	5	0	1	31	5030600000000000	00	00	00000000	0	0	00000000	24	05	09
45	00	01	04	04	3	0	00	02	1200	3	00000000	0	0	1	3	22	0000000000000000	00	00	00000000	6	2	69000000	33	07	11
45	00	01	03	03	3	0	14	01	0000	2	00000000	0	0	3	3	09	0000000000000000	00	00	00000004	1	0	00000000	33	04	07
45	00	01	03	03	1	0	26	00	0002	0	00000000	0	2	7	0	00	0000000000000000	00	00	00000000	0	0	00000000	44	06	09
45	00	03	07	08	1	1	22	02	1700	1	00000000	0	0	3	6	00	0000000000000000	00	00	00000000	0	0	00000000	44	07	07
45	00	01	03	06	1	1	22	01	0000	1	10000000	0	0	0	3	60	0000000000000000	00	00	00000000	0	0	00000000	44	08	08
45	00	03	14	04	1	0	24	01	1400	1	00000000	0	0	3	6	00	0309000000000000	00	00	00000000	6	1	00000000	44	06	08
45	00	01	03	04	3	0	34	01	0000	3	00000000	0	0	3	1	17	0506000000000000	00	00	00000000	0	8	00000000	24	07	10
45	00	01	03	06	1	0	24	01	0000	1	00000000	0	0	3	6	00	0000000000000000	00	00	00000000	0	0	00000000	44	05	07
45	00	01	04	04	1	0	34	02	0000	2	00000000	2	0	2	7	00	1103000000000000	00	00	00000000	0	0	00000000	67	06	05
45	00	01	03	04	3	0	22	01	0000	3	00000000	0	0	1	3	15	0206000000000000	00	00	00000000	0	0	00000000	24	07	11
45	00	01	03	04	1	0	26	02	1200	2	00000000	0	0	2	7	00	0000000000000000	00	00	00000000	0	0	00000000	44	06	10
45	00	02	04	03	3	1	00	01	1000	0	30000000	0	6	0	2	32	1000000000000000	00	00	00000000	0	0	00000000	33	07	08
45	00	01	01	04	1	0	00	02	0000	2	00000000	0	0	0	2	70	0000000000000000	00	00	00000000	0	0	00000000	44	07	09
45	00	01	04	02	3	0	28	01	1300	3	00000000	0	0	0	1	31	0000000000000000	00	80	00000000	0	2	10000000	42	05	10
45	00	01	02	03	3	1	16	01	0000	3	00000000	0	0	1	1	16	0000000000000000	00	00	00000000	0	0	80000000	33	04	09
45	00	01	02	03	3	0	00	01	0000	2	00000000	0	0	3	1	16	0505000000000000	00	00	00000000	0	0	00000000	24	06	09
45	00	01	01	04	3	1	14	02	0000	1	00000000	0	0	3	1	16	0147000000000000	00	00	00000000	0	0	00000000	65	07	11
45	00	01	03	04	1	0	40	01	0000	2	00000000	5	0	2	7	00	0000000000000000	00	00	00000000	0	0	00000000	44	05	07
45	00	01	02	04	3	0	00	02	0000	3	00000000	0	0	2	3	12	0127000000000000	00	00	00000000	0	0	00000000	24	07	11
45	00	01	03	03	1	0	14	01	0000	1	00000000	0	0	3	6	00	2503000000000000	00	00	00000000	0	0	00000000	44	05	05
45	00	01	03	04	3	0	28	01	0000	3	00000000	0	0	2	1	15	2005000000000000	00	00	00000000	0	0	00000000	33	05	08
45	00	01	03	04	3	0	00	01	0000	3	00000000	0	0	1	3	24	0000000000000000	00	00	00000000	0	0	00000000	33	07	08
45	00	01	02	03	3	1	22	02	1700	3	00000000	0	0	1	1	13	0223000000000000	00	00	00000000	0	0	00000000	45	05	07
45	00	02	04	03	3	0	00	01	0300	3	00000000	0	0	2	1	14	1206000000000000	00	00	00000000	0	0	00000000	43	05	11
45	00	01	03	03	3	0	34	02	0000	3	00000000	0	0	2	3	16	2006000000000000	00	00	00000000	0	0	00000000	37	05	09
45	00	01	02	04	3	1	00	02	0000	3	00000000	0	0	2	3	12	0506000000000000	00	00	00000000	0	0	00000000	24	06	10
45	00	01	03	03	3	0	18	02	0000	3	00000000	0	0	1	3	23	0000000000000000	00	00	00000000	0	8	00000000	33	06	07
45	00	01	02	03	3	0	00	02	0000	3	00000000	0	0	2	3	16	0905000000000000	00	00	00000000	0	0	00000000	24	06	09
45	00	01	02	03	3	0	00	01	0000	3	00000000	0	0	2	1	13	0506000000000000	00	00	00000000	0	0	00000000	24	06	09
45	00	02	04	03	3	1	00	02	0000	2	00000000	0	0	2	3	16	0000000000000000	00	00	00000000	0	0	00000000	33	05	08
45	00	01	02	03	3	0	00	02	0000	3	00000000	0	0	1	3	16	0000000000000000	00	00	25030000	0	0	00000000	33	04	07

continued on next page

Table A1. — *continued*

Variable Number

			1 1	1	1	1 1	1 1	1 1 2 2	2	2 2 2 2 2 2 2 3	3	3	3	3	3 3	3 3 3 4 4 4 4 4 4 4 4 4 4 5 5 5	5 5	5 5	5 5 5 6 6 6 6 6	6	6	6 6 6 7 7 7 7 7	7 7	7 7	7 8
1 2 3 4 5	6 7	8 9	0 1	2	3	4 5	6 7	8 9 0 1	2	3 4 5 6 7 8 9 0	1	2	3	4	5 6	7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2	3 4	5 6	7 8 9 0 1 2 3 4	5	6	7 8 9 0 1 2 3 4	5 6	7 8	9 0
45 00	01	02	02	3	0	00	07	0000	3	00000000	0	0	2	3	19	0000000000000000	00	00	00000000	0	0	00000000	33	06	07
45 00	01	04	04	3	1	20	02	0000	1	00000000	0	0	2	3	16	0707000000000000	00	00	25030000	0	0	00000000	18	05	10
45 00	01	03	05	3	0	00	02	0000	2	00000000	0	0	2	1	16	0106000000000000	00	00	00000000	0	8	00000000	24	06	14
45 00	01	04	02	3	0	16	01	0200	3	00000000	0	0	2	5	12	0706000000000000	00	00	00000000	0	0	00000000	00	04	11
45 00	01	03	03	3	0	34	02	1700	2	00000000	0	0	2	1	19	1866000000000000	00	00	00000000	0	0	00000000	00	05	09
45 00	01	03	04	3	0	00	01	0000	2	00000000	0	0	3	1	18	0107000000000000	00	00	00000000	0	0	00000000	24	08	12
45 00	01	03	04	3	0	34	01	0000	3	00000000	0	0	2	3	14	0106000000000000	00	00	00000000	0	0	00000000	24	06	08
45 00	01	03	05	1	1	22	01	0000	1	00000000	0	0	3	6	00	0000000000000000	00	00	00000000	0	0	00000000	44	06	08
45 00	01	04	04	3	1	40	01	0000	3	00000000	0	0	2	3	12	0505000000000000	00	00	00000000	0	0	00000000	24	05	08
45 00	01	02	03	3	0	00	02	2800	3	00000000	0	0	3	3	17	0307000000000000	00	00	00000000	0	0	00000000	24	07	08
45 00	01	03	03	2	0	00	02	0000	3	00000000	0	0	1	3	22	0000000000000000	00	00	01010000	0	0	00000000	33	09	08
45 00	01	03	03	1	0	00	06	0000	1	00000000	0	0	3	6	00	0000000000000000	00	00	00000000	0	8	00000000	44	09	08
45 00	01	01	02	2	0	00	01	0000	2	00000000	0	0	1	3	15	0107000000000000	00	00	00000000	0	0	00000000	24	06	09
45 00	01	03	02	3	0	20	02	1200	1	00000000	0	0	3	5	13	0000000000000000	00	04	00000000	0	0	00000000	14	04	11
45 00	01	02	02	3	0	14	01	0000	3	00000000	0	0	2	3	11	0706000000000000	00	00	00000000	0	0	00000000	24	04	08
45 00	01	01	03	3	0	00	02	0000	2	00000000	0	0	3	3	10	0813000000000000	04	00	00000000	0	0	00000000	25	05	08
45 00	05	12	04	3	0	34	01	0300	0	00000000	0	0	2	1	15	1259000000000000	00	00	00000000	0	0	00000000	43	05	10
45 00	01	03	04	3	0	34	02	0200	3	00000000	0	0	2	3	11	0907000000000000	00	00	25030000	0	0	00000000	24	06	09
45 00	01	03	04	1	0	00	04	0000	1	00000000	0	0	3	6	00	0000000000000000	00	00	00000000	4	0	00000000	44	11	08
45 00	01	03	05	3	0	40	02	0000	2	00000000	0	0	3	1	16	0000000000000000	00	00	00000000	0	0	00000000	33	06	09
45 00	01	01	02	1	0	00	02	0000	1	00000000	0	0	3	6	00	1867000000000000	00	00	00000000	0	0	00000000	53	07	06
45 00	01	01	04	1	0	00	01	1200	1	00000000	0	0	3	6	00	0000000000000000	00	00	00000000	0	0	00000000	44	06	09
45 00	01	02	04	3	0	00	01	0000	3	00000000	0	0	2	3	13	0000000000000000	00	00	00000000	0	0	00000000	33	04	08
45 00	01	03	04	3	1	00	01	0000	3	00000000	0	0	2	1	15	0307000000000000	00	00	00000000	0	8	00000000	24	06	08
45 00	01	03	03	3	1	18	01	0000	3	00000000	0	0	1	3	18	0806000000000000	11	00	00000000	0	8	00000000	24	05	11
45 00	01	04	03	1	0	16	03	0000	1	00000000	1	0	3	6	00	0000000000000000	00	00	00000000	0	0	00000000	44	08	05
45 00	01	03	04	1	0	14	02	0000	1	00000000	0	0	3	6	00	0000000000000000	00	00	00000000	0	0	00000000	44	06	07
45 00	01	03	05	3	0	00	03	0000	0	00000000	0	0	1	3	30	0000000000000000	00	00	00000000	6	1	00000000	33	06	09
45 00	01	02	03	2	0	00	01	0000	2	00000000	0	0	1	3	23	0000000000000000	00	00	00000000	0	0	00000000	33	05	13
45 00	01	02	03	3	0	00	01	0000	2	00000000	0	0	2	1	17	0307000000000000	00	00	00000000	0	0	00000000	24	08	09
45 00	01	02	03	3	1	00	02	0000	3	00000000	0	0	1	3	14	0824000000000000	00	00	00000000	0	0	00000000	25	06	09
45 00	01	03	03	3	0	24	01	0100	3	00000000	0	0	1	3	16	1205000000000000	00	00	00000000	0	0	00000000	43	06	07
45 00	01	03	03	2	0	00	06	0200	3	00000000	0	0	1	3	20	0705000000000000	00	00	00000000	0	0	00000000	24	06	05
45 00	01	03	02	2	0	00	01	0000	3	00000000	0	0	2	1	15	0550000000000000	00	00	00000000	0	0	00000000	24	07	11

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45 00 01 02 03 3 0 18 01 0000 3 00000000 0 0 2 3 08 0000000000000000 00 00 00000000 0 0 00000000 33 04 06
45 00 01 02 03 3 0 00 02 0000 3 00000000 0 0 2 1 10 0103000000000000 00 00 00000000 3 2 37000000 36 05 09
45 00 01 02 02 3 0 00 02 0000 3 00000000 0 0 2 3 16 0806000000000000 00 00 00000000 0 0 00000000 24 05 08
45 00 01 02 03 3 0 00 01 0000 2 00000000 0 0 2 3 15 0000000000000000 00 00 00000000 0 0 00000000 3 30 708
45 00 01 02 02 1 0 00 01 0000 1 00000000 3 0 3 6 00 0000000000000000 00 00 00000000 0 0 00000000 4 40 605
45 00 01 02 02 2 0 00 01 0000 3 00000000 0 0 2 3 15 0000000000000000 04 00 00000000 6 1 00000000 4 20 509
45 00 01 01 03 3 0 00 01 0000 3 00000000 0 0 2 1 14 0107000000000000 00 00 00000000 0 0 00000000 2 40 610
45 00 02 04 02 2 0 00 01 0000 3 00000000 0 0 2 3 17 0000000000000000 00 00 25030000 0 0 00000000 3 30 306
45 00 01 02 02 2 0 00 01 0000 3 00000000 0 0 1 3 16 0106000000000000 00 00 00000000 0 0 00000000 2 40 712
45 00 01 03 03 3 0 00 07 0000 3 00000000 0 0 1 3 10 0000000000000000 00 00 00000000 0 0 00000000 3 30 705
45 00 01 01 02 3 0 00 02 0000 2 00000000 0 0 2 3 12 0106000000000000 00 00 00000000 0 0 80000000 2 40 609
45 00 01 03 03 3 1 40 02 0000 3 00000000 0 0 1 3 16 1801000000000000 00 00 00000000 0 0 00000000 0 00 608
45 00 01 02 02 3 0 00 01 0000 3 00000000 0 0 1 3 14 0000000000000000 00 00 00000000 0 0 00000000 3 30 408
45 00 01 01 03 3 0 00 02 0000 1 00000000 0 0 3 1 16 0807000000000000 00 00 00000000 0 0 00000000 1 80 611
45 00 01 01 04 3 0 00 02 0000 1 00000000 0 0 1 3 19 0807000000000000 00 00 00000000 0 0 00000000 1 80 510
45 00 02 04 03 1 0 00 02 0000 1 00000000 0 0 3 6 00 0000000000000000 00 00 00000000 0 0 00000000 4 40 706
45 00 01 02 04 1 1 00 01 0000 3 00000000 1 0 1 7 00 1203000000000000 00 00 00000000 0 0 00000000 4 30 506
45 00 01 04 07 4 1 22 02 0100 3 00000000 0 0 2 3 15 0824000000000000 04 00 00000000 0 0 00000000 2 50 710
45 00 01 03 04 3 1 40 01 0000 3 00000000 0 0 2 3 21 0807000000000000 04 00 00000000 0 8 00000000 2 40 714
45 00 01 02 05 3 0 00 01 1700 3 00000000 0 0 2 3 13 0000000000000000 00 00 00000000 0 0 00000000 3 30 507
45 00 03 16 07 3 1 34 01 0000 2 00000000 0 0 2 3 10 0000000000000000 00 00 25030000 0 8 00000000 3 30 709
45 00 01 03 05 1 1 00 07 0100 3 00000000 0 0 1 8 00 0000000000000000 00 00 00000000 0 8 00000000 4 40 705
45 00 01 02 05 3 0 00 01 0000 3 00000000 0 0 1 3 18 0000000000000000 00 00 00000000 0 0 00000000 3 30 712
45 00 01 01 05 3 0 00 02 0000 3 00000000 0 0 1 3 16 0807000000000000 00 00 00000000 0 0 00000000 2 40 708
45 00 01 02 04 3 1 00 01 0000 3 00000000 0 0 1 3 33 0000000000000000 00 00 00000000 0 0 00000000 3 30 609
45 00 02 05 07 3 1 34 02 0200 3 00000000 0 0 2 1 20 0000000000000000 00 00 00000000 0 0 00000000 3 30 610
45 00 01 02 03 3 0 00 01 0000 3 00000000 0 0 1 3 25 0000000000000000 00 00 00000000 0 0 00000000 3 30 610
45 00 02 07 04 1 1 26 07 0000 1 00000000 0 0 3 6 00 0000000000000000 00 00 00000000 0 0 00000000 4 40 707
45 00 01 03 05 3 1 26 02 0000 1 00000000 0 0 2 3 15 0107000000000000 00 00 00000000 0 0 00000000 1 80 510
45 00 01 02 04 3 0 00 01 0000 2 00000000 0 0 1 3 22 0000000000000000 00 00 00000000 0 0 00000000 3 30 613
45 00 01 02 03 3 0 00 01 0300 3 00000000 0 0 1 3 20 0000000000000000 00 00 00000000 0 0 00000000 3 30 810
45 00 01 02 04 1 0 00 01 0000 1 00000000 0 0 3 6 00 0000000000000000 00 00 00000000 0 0 00000000 4 40 706
45 00 02 04 04 3 0 00 02 0000 3 00000000 0 0 1 3 20 0000000000000000 00 00 00000000 6 1 00000000 3 30 808
45 00 01 02 04 3 0 00 01 0000 2 00000000 0 0 1 3 12 0000000000000000 00 00 25030000 0 8 00000000 3 30 508
45 00 01 01 03 3 0 00 01 0000 2 00000000 0 0 2 3 16 0000000000000000 00 00 00000000 0 0 00000000 3 30 608
45 00 01 02 03 3 0 00 01 0000 3 00000000 0 0 2 3 18 1865000000000000 00 00 00000000 0 0 00000000 0 00 511
45 00 01 04 02 3 0 00 01 0000 3 00000000 0 0 2 3 17 0000000000000000 00 00 00000000 3 1 00000000 3 30 510
45 00 01 03 03 3 0 00 01 0000 2 00000000 0 0 3 3 11 0000000000000000 00 00 00000000 3 1 00000000 3 30 608
45 00 01 05 03 3 0 40 01 0000 3 00000000 0 0 2 3 18 0106000000000000 00 00 00000000 0 0 00000000 2 40 712
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continued on next page

TABLE A1. — *continued*

```
                                            Variable Number
                 11 1 1 11 11 1122 2 22222223 3 3 33333 3344444444445555 55 55 55666666 6 6 66777777 7 77 78
12345 67 89 01 2 3 45 67 8901 2 34567890 1 2 34567 8901234567890123 45 67 89012345 6 7 89012345 6 78 90

  45 00 01 01 04 3 1 00 01 0000 3 00000000 0 0 23180 7230000000000001 10 00 00000000 0 0 00000004 5 04 08
  45 00 01 02 04 3 1 00 02 1700 3 00000000 0 0 23210 0000000000000000 00 00 00000000 0 0 00000003 3 05 08
  45 00 01 01 04 3 1 00 01 0000 3 00000000 0 0 23210 8060000000000000 00 00 00000000 0 0 00000002 4 08 08
  45 00 01 01 04 3 0 00 02 0000 3 00000000 0 0 13140 8060000000000000 00 00 00000000 0 0 00000002 4 05 10
  45 00 01 03 03 3 0 00 01 0000 3 00000000 0 0 23160 0000000000000000 00 00 00000000 0 0 00000003 3 06 08
  45 00 01 02 03 3 0 00 01 0000 2 00000000 0 0 13150 0000000000000000 00 00 00000000 0 0 00000003 3 07 11
  45 00 01 01 03 3 0 00 01 0000 3 00000000 0 0 23180 0000000000000000 00 00 00000000 0 0 00000003 3 06 09
  45 00 01 02 03 3 0 00 01 0000 2 00000000 0 0 13150 0000000000000000 00 00 00000000 0 0 00000003 3 05 13
  45 00 01 01 05 3 0 00 02 0000 2 00000000 0 0 13240 6050000000000000 00 00 00000000 0 0 00000002 4 06 09
  45 00 01 03 05 3 1 28 01 0000 2 00000000 0 0 13200 9060000000000000 00 00 00000000 0 0 00000002 4 05 11
  45 00 01 01 03 3 1 00 02 0000 3 00000000 0 0 13230 0000000000000000 00 00 00000000 0 0 00000003 3 07 11
  45 00 01 01 04 3 0 00 02 0000 3 00000000 0 0 23150 0000000000000000 00 00 00000000 0 0 00000003 3 05 10
  45 00 01 02 04 3 0 00 02 0000 2 00000000 0 0 31150 0000000000000000 00 00 00000000 0 0 00000003 3 06 10
  45 00 01 03 03 3 1 00 02 0000 3 00000000 0 0 25120 0000000000000000 00 00 00000000 0 0 00000003 3 07 11
  45 00 01 02 02 3 0 00 02 0000 3 00000000 0 0 13130 0000000000000000 00 00 00000000 0 0 00000003 3 05 08
  45 00 01 02 02 3 1 00 01 0000 1 00000000 0 0 23120 0000000000000000 00 00 00000000 0 0 00000003 3 05 10
  45 00 01 02 03 3 0 00 01 0000 3 00000000 0 0 23080 0000000000000000 00 00 00000000 8 0 00000003 3 07 09
  45 00 01 01 02 3 0 00 01 0000 2 00000000 0 0 11120 0000000000000000 00 00 00000000 0 0 00000003 3 05 10
  45 00 01 01 03 1 0 00 07 0000 1 00000000 0 0 36000 0000000000000000 00 00 00000000 0 0 00000004 4 06 07
  45 00 01 04 03 3 1 40 02 0000 3 00000000 0 0 21120 1060000000000000 00 00 00000000 0 0 00000002 4 06 10
  45 00 01 02 03 3 0 00 01 0000 3 00000000 0 0 13180 0000000000000000 00 00 00000000 0 0 00000003 3 06 07
  45 00 01 02 03 3 0 00 02 0000 3 00000000 0 0 13140 0000000000000000 00 00 00000000 0 0 00000003 3 07 08
  45 00 01 02 02 3 1 00 02 0000 3 00000000 0 0 23140 0000000000000000 00 00 00000000 0 0 00000003 3 04 08
  45 00 01 02 03 3 0 00 02 0000 2 00000000 0 0 13100 0000000000000000 00 00 00000000 0 0 00000003 3 07 09
  45 00 01 03 03 3 1 34 01 0000 2 00000000 0 0 13130 7060000000000000 00 00 00000000 0 0 00000002 4 06 08
  45 00 01 02 03 3 0 00 01 0000 2 00000000 0 0 31120 0000000000000000 00 02 50300000 0 0 00000003 3 06 10
  45 00 01 02 01 3 0 00 01 0000 3 00000000 0 0 13080 0000000000000000 00 00 00000000 0 0 00000003 3 06 06
  45 00 01 02 02 3 0 00 01 0000 3 00000000 0 0 13130 7050000000000000 00 00 00000000 0 0 00000002 4 07 08
  45 00 01 02 02 3 0 00 01 0000 2 00000000 0 0 23090 0000000000000000 00 00 00000000 0 0 00000003 3 04 07
  45 00 01 02 01 3 0 00 01 0000 3 00000000 0 0 13100 0000000000000000 00 00 00000000 0 0 00000003 3 04 07
  45 00 01 03 03 3 0 00 02 0000 3 00000000 0 0 13160 0000000000000000 00 00 00000000 0 0 00000003 3 06 08
  45 00 01 03 02 3 0 00 02 0000 3 00000000 0 0 21120 3070000000000000 00 00 00000000 0 0 00000002 4 06 08
  45 00 01 02 03 1 0 00 01 0000 1 00000000 0 0 36000 0000000000000000 00 00 00000000 0 0 00000004 4 05 07
  45 00 02 07 04 3 0 10 01 0000 2 00000000 0 0 11110 0000000000000000 00 00 00000000 0 0 00000003 3 06 07
```

```
45 00 01 02 06 3 1 00 02 0000 3 00000000 0 0 13130 1060000000000000 00 00 00000000 8 0 60000002 4 06 11
45 00 01 03 06 1 0 00 02 0000 1 00000000 0 0 36000 0000000000000000 00 00 00000000 0 0 00000004 4 06 10
45 00 01 03 03 3 0 16 02 0000 1 00000000 0 0 21090 1100000000000000 00 00 00000000 0 0 00000001 8 04 07
45 00 01 05 03 3 1 22 02 0000 3 00000000 0 0 25190 5060000000000000 00 00 00000000 0 0 00000002 4 06 14
45 00 02 05 03 3 0 00 02 0100 2 00000000 0 0 25150 5030000000000000 00 00 00000003 1 4 20000002 6 08 13
45 00 01 04 05 1 0 18 01 0000 1 00000000 0 0 36000 0000000000000000 00 00 00000004 1 0 00000004 4 05 06
45 00 01 03 03 3 0 00 07 1700 3 00000000 0 0 13180 0000000000000000 00 00 00000000 0 0 00000003 3 07 06
45 00 01 02 02 3 0 00 02 0000 3 00000000 0 0 21130 1290000000000000 00 00 00000000 0 0 00000002 5 05 07
45 00 01 02 02 2 0 00 02 1700 3 00000000 0 0 13180 1070000000000000 00 00 00000000 0 0 00000002 4 06 10
45 00 01 04 05 1 1 00 02 1200 1 00000000 0 0 36000 0000000000000000 00 00 00000004 1 0 00000004 4 08 09
45 00 01 04 05 3 0 00 02 0000 2 00000000 0 0 13310 0000000000000000 00 00 00000000 0 0 00000003 3 07 09
45 00 01 03 04 3 0 00 01 0000 3 00000000 0 0 23190 1070000000000000 00 00 00000000 8 0 00000002 4 06 11
45 00 01 02 03 3 0 00 02 2100 2 25250000 0 0 23151 8640000000000000 00 00 00000000 0 0 00000000 0 07 10
45 00 01 02 02 3 0 00 02 0000 2 00000000 0 0 31130 9070000000000000 00 00 00000000 0 0 00000002 4 06 09
45 00 01 02 04 3 1 00 02 0000 3 00000000 0 0 21150 1060000000000000 00 00 00000000 0 0 00000002 4 06 09
45 00 01 02 06 3 0 00 01 0000 2 00000000 0 0 23150 1060000000000000 00 00 00000000 0 0 00000002 4 06 11
45 00 01 02 05 3 0 00 01 0000 2 00000000 0 0 23110 0000000000000000 00 00 00000000 0 0 00000003 3 05 08
45 00 01 02 02 3 0 08 02 0700 3 00000000 0 0 23111 2050000000000000 00 00 00000000 0 0 00000004 3 05 07
45 00 01 02 04 3 0 00 02 0000 2 00000000 0 0 23180 9060000000000000 00 00 00000000 0 0 00000002 4 05 09
45 00 01 02 03 3 1 00 02 0000 3 00000000 0 0 13100 1050000000000000 00 00 00000004 1 0 00000002 4 07 07
45 00 01 02 02 3 0 00 01 0100 3 00000000 0 0 13180 8060000000000000 00 00 00000000 0 0 00000002 4 06 04
45 00 01 02 04 3 1 00 01 0000 3 00000000 0 0 13110 1080000000000000 00 00 00000000 0 0 00000002 4 05 07
45 00 01 02 03 3 0 00 02 0000 3 00000000 0 0 23130 9050000000000000 00 00 00000000 0 0 00000002 4 06 10
45 00 01 01 04 3 1 00 01 0000 2 00000000 0 0 21130 1060000000000000 00 00 00000000 0 0 00000002 4 04 07
45 00 01 01 03 3 0 00 01 0000 3 00000000 0 0 13170 0000000000000000 00 00 00000000 0 0 00000003 3 08 10
45 00 01 02 03 1 0 00 01 0100 1 00000000 0 0 36002 5030000000000000 00 00 00000000 0 0 00000004 4 08 06
45 00 01 02 03 3 0 10 02 1700 3 00000000 0 0 13090 1080000000000000 00 00 00000000 0 0 00000000 0 05 06
45 00 01 01 05 3 0 00 01 0000 3 00000000 0 0 11140 9050000000000000 00 00 00000000 0 0 00000002 4 04 10
45 00 01 01 04 3 0 00 02 0000 3 00000000 0 0 23170 1070000000000000 00 00 00000000 0 0 00000002 4 04 06
45 00 01 03 03 3 0 34 02 0000 3 00000000 0 0 13180 8240000000000001 10 00 00000000 0 0 00000002 5 05 09
45 00 01 02 04 3 0 00 02 1700 3 00000000 0 0 23171 8660000000000000 00 00 00000000 0 0 00000000 0 07 13
45 00 01 01 04 3 0 00 02 0000 3 00000000 0 0 21170 8070000000000000 00 00 00000000 0 0 00000002 4 06 09
45 00 01 02 04 3 1 16 01 0000 2 00000000 0 0 13120 1060000000000000 00 00 00000000 8 0 00000002 4 05 07
45 00 01 01 03 3 0 00 01 1700 2 00000000 0 0 23162 0080000000000000 00 00 00000000 0 0 00000003 7 05 10
45 00 01 02 03 3 1 00 03 0000 3 00000000 0 0 21110 0000000000000000 00 00 00000000 0 0 00000003 3 04 09
45 00 01 02 02 3 0 00 02 0000 3 00000000 0 0 21110 8070000000000000 00 00 00000000 2 0 50000002 4 06 09
45 00 01 02 03 3 1 00 02 0700 3 00000000 0 0 13201 2060000000000000 00 00 00000000 0 0 00000004 3 05 07
45 00 01 03 02 3 0 14 02 2600 1 00000000 0 0 13120 1230000000000000 00 00 00000000 0 0 00000001 8 07 09
45 00 01 02 02 3 0 00 01 0000 2 00000000 0 0 13120 0000000000000000 00 00 00000000 0 00000000 3 3 04 10
```

continued on next page

TABLE A1. — *continued*

Variable Number

				1 1	1	1	1 1	1 1	1 1 2 2	2	2 2 2 2 2 2 2 3	3	3	3	3	3 3	3 3 3 4 4 4 4 4 4 4 4 4 4 5 5 5 5	5 5	5 5	5 5 6 6 6 6 6	6	6	6 6 7 7 7 7 7 7	7 7	7 7	7 8
1 2 3	4 5	6 7	8 9	0 1	2	3	4 5	6 7	8 9 0 1	2	3 4 5 6 7 8 9 0	1	2	3	4	5 6	7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3	4 5	6 7	8 9 0 1 2 3 4	5	6	7 8 9 0 1 2 3 4	5 6	7 8	9 0
45	00	01	02	02	1	0	00	04	0000	1	00000000	1	0	3	6	00	00000000000000000	00	00	0000000	0	0	00000000	00	08	07
45	00	01	01	03	1	1	00	04	0000	1	00000000	0	0	3	6	00	00000000000000000	00	00	0000000	0	0	00000000	44	09	07
45	00	01	02	03	1	0	00	03	0700	1	00000000	0	0	3	6	00	00000000000000000	00	00	0000000	0	0	00000000	44	10	08
45	00	01	02	03	3	0	00	01	1400	2	00000000	0	0	2	1	17	01070000000000000	00	00	0000000	0	0	00000000	24	06	10
45	00	01	01	02	3	0	00	01	0000	3	00000000	0	0	2	1	12	01060000000000000	00	00	0000000	0	0	00000000	24	04	07
45	00	01	02	03	1	0	00	01	1200	2	00000000	0	0	2	7	00	00000000000000000	00	00	0000000	0	0	00000000	12	07	08
45	00	01	01	03	3	0	00	01	0000	2	00000000	0	0	2	3	09	01080000000000000	00	00	0000000	0	0	00000000	18	04	06
45	00	01	01	03	3	1	00	02	0000	1	00000000	0	0	2	3	20	00000000000000000	00	00	0000000	0	0	00000000	33	04	11
45	00	01	01	05	1	0	00	01	0000	2	25030000	0	0	2	7	00	00000000000000000	00	00	0000000	0	0	00000000	44	06	06
45	00	01	03	03	1	1	20	02	0000	2	00000000	0	0	2	7	00	00000000000000000	00	00	0000000	0	0	00000000	44	05	06
45	00	01	02	05	3	0	00	01	0100	3	00000000	0	0	2	3	17	05060000000000000	00	00	0000000	0	2	72000000	25	06	11
45	00	01	03	03	3	0	00	01	0000	3	00000000	0	0	4	3	15	00000000000000000	00	00	0000000	0	0	00000000	33	08	08
45	00	01	02	04	1	1	00	02	0000	3	00000000	0	0	1	8	00	00000000000000000	00	00	0000000	0	0	00000000	44	07	08
45	00	01	02	04	1	0	00	01	0000	1	00000000	0	0	3	6	00	00000000000000000	00	00	0000000	0	0	00000000	44	08	07

TABLE A2. CERAMIC DATA FROM THE NYSM COLLECTION.

Variable Number

1 2 3	4 5	6 7	8 9	10 11	12	13	14 15	16 17	18 19 20 21	22	23 24 25 26 27 28 29 30	31	32	33	34	35 36	37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53	54 55	56 57	58 59 60 61 62 63 64	65	66	67 68 69 70 71 72 73	74 75 76	77 78	79 80
45	01	01	05	06	1	1	18	01	0000	2	00000000	0	0	2	6	00	00000000000000000	00	00	0000000	0	0	00000000	44	08	08
45	01	01	06	06	3	0	40	02	0000	3	00000000	0	0	2	3	21	01230000000000000	00	00	0000000	0	0	00000000	45	07	11
45	01	01	04	07	1	1	00	02	1700	1	00000000	0	0	3	6	00	12000000000000000	00	00	0000000	0	0	00000000	43	06	04
45	01	02	11	65	3	0	74	02	0000	2	00000000	0	0	2	1	16	03060000000000000	00	00	0000000	0	0	00000000	24	06	11
45	01	01	04	05	3	0	00	02	0300	2	00000000	1	0	1	3	29	07230000000000001	20	00	0000000	0	0	00000000	45	07	09
45	01	01	04	05	3	0	00	01	0000	3	00000000	0	0	2	3	19	00000000000000000	10	00	0000000	0	0	00000000	42	06	13
45	01	01	05	04	3	1	28	11	0000	3	00000000	0	0	1	3	18	00000000000000000	30	00	0000000	0	0	00000000	42	06	11
45	01	01	04	06	1	0	00	02	0100	3	00000000	0	0	1	8	00	00000000000000000	00	00	0000000	0	0	00000000	44	07	07
45	01	01	02	05	3	0	00	01	0000	3	00000000	0	0	1	3	22	00000000000000000	00	00	0000000	0	0	00000000	33	09	13
45	01	01	04	07	3	0	34	01	0000	2	00000000	0	0	1	3	18	00000000000000000	00	00	0000000	0	0	00000000	33	06	10
45	01	01	05	05	3	0	00	01	0000	3	00000000	0	0	2	1	08	09230000000000000	00	00	0000000	0	9	23000000	45	06	11
45	01	01	03	05	1	1	00	01	0000	1	00000000	0	0	3	6	00	18640000000000000	00	00	0000000	0	0	00000000	44	06	08
45	01	06	21	05	3	0	22	01	0000	2	00000000	0	0	2	3	17	00000000000000000	00	00	0000000	0	0	00000000	33	06	09
45	01	03	11	05	3	0	00	02	0000	3	00000000	0	0	2	3	16	02050000000000000	00	00	0000000	6	2	69000000	24	05	07
45	01	01	05	07	3	0	40	01	0000	3	00000000	0	0	1	3	29	00000000000000000	00	00	0000000	0	0	00000000	33	07	07
45	01	01	03	03	3	1	00	01	0300	3	00000000	0	0	2	1	22	12060000000000000	00	00	0000000	0	0	00000000	43	05	11
45	01	01	03	04	3	0	00	02	0000	1	00000000	0	0	3	3	15	08230000000000000	00	00	0000000	0	0	00000000	45	06	10
45	01	01	06	05	3	0	40	01	0200	3	00000000	0	0	1	3	16	01060000000000000	00	00	0000000	0	0	00000000	56	08	10
45	01	01	05	05	3	1	00	01	0000	3	00000000	0	0	2	1	18	09050000000000000	00	00	0000000	0	0	00000000	24	06	10
45	01	02	07	04	3	0	00	01	0000	2	00000000	0	0	1	3	20	00000000000000000	00	00	0000000	0	0	00000000	33	06	12
45	01	02	06	04	3	0	00	02	0000	2	00000000	0	0	2	1	16	08240000000000000	00	00	0000000	3	2	41000000	25	06	14
45	01	01	04	04	3	0	00	02	0000	3	00000000	0	0	2	1	18	02050000000000000	00	00	0000000	0	0	00000000	24	06	10
45	01	01	04	02	3	0	00	02	0000	2	00000000	0	0	3	1	12	09070000000000000	00	00	0000000	0	0	00000000	24	07	09
45	01	03	15	04	3	1	00	01	0000	2	00000000	0	0	2	1	17	09070000000000000	00	00	0000000	2	2	73000000	24	07	10
45	01	01	03	04	3	0	00	02	0300	3	00000000	0	0	2	3	18	00000000000000000	00	00	0000000	0	0	00000000	33	05	10
45	01	02	05	06	1	0	00	03	0000	1	00000000	5	0	3	6	00	00000000000000000	00	00	0000000	0	0	00000000	12	13	10
45	01	01	03	04	3	0	00	02	0000	2	00000000	0	0	2	1	21	08070000000000000	80	00	0000000	3	2	73000000	25	09	11
45	01	01	03	03	3	1	00	02	0000	3	00000000	4	0	1	3	14	00000000000000000	00	00	0000000	0	0	00000000	33	07	10
45	01	04	12	07	1	1	40	02	0000	1	00000000	0	0	3	6	00	00000000000000000	00	00	0000000	0	0	00000000	44	05	08
45	01	01	04	04	1	0	00	01	0100	2	00000000	0	0	2	7	00	00000000000000000	00	00	0000000	0	0	00000000	44	08	10
45	01	01	03	03	3	0	00	02	0000	2	00000000	0	0	2	3	14	18640000000000000	00	00	0000000	0	0	00000000	00	05	08
45	01	01	04	08	4	0	00	01	0000	2	00000000	0	3	2	3	16	01060000000000001	10	00	0000000	0	8	00000000	24	05	08
45	01	01	05	04	3	0	40	02	0000	3	00000000	0	0	2	3	17	01070000000000000	00	00	0000000	0	0	00000000	24	08	08
45	01	01	04	04	3	0	00	01	0000	2	00000000	0	0	3	1	15	08070000000000000	00	00	0000000	0	0	00000000	24	06	08

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Table A2. — *continued*

Variable Number

				11	1	1	11	11	1122	2	22222223	3	3	3	3	33	3334444444444555	55	55	55566666	6	6	66677777	77	77	78
123	45	67	89	01	2	3	45	67	8901	2	34567890	1	2	3	4	56	7890123456789012	34	56	78901234	5	6	78901234	56	78	90
45	01	01	05	04	1	1	00	03	0000	1	00000000	6	0	3	6	00	0000000000000000	00	00	00000000	0	0	00000000	12	15	07
45	01	01	03	06	3	0	00	02	1200	2	00000000	0	0	2	1	19	2230000000000000	00	00	00000000	0	0	00000000	45	06	08
45	01	02	07	08	1	0	40	02	0000	2	20000000	0	0	1	7	00	0000000000000000	00	00	00000003	1	0	00000000	44	10	12
45	01	01	06	05	3	1	34	02	0000	2	00000000	0	0	1	3	11	2230000000000000	00	00	00000000	0	0	00000000	45	05	09
45	01	01	04	03	3	0	00	02	0100	3	00000000	0	0	1	3	15	0000000000000000	00	00	00000000	0	0	00000000	33	05	08
45	01	01	09	07	3	1	34	01	1200	3	00000000	0	0	1	3	51	0000000000000000	00	00	00000000	0	0	00000000	33	06	08
45	01	01	04	06	1	0	00	01	0700	3	00000000	1	0	1	8	00	1200000000000000	00	00	00000000	0	0	00000000	43	08	09
45	01	02	12	07	3	0	00	02	0200	3	00000000	0	0	2	1	16	0000000000000000	00	00	00000000	3	1	00000000	33	05	11
45	01	01	05	06	3	1	00	02	1700	2	00000000	0	0	2	1	25	1864000000000000	00	00	00000000	0	0	00000000	53	06	13
45	01	02	09	14	3	0	26	02	0000	2	00000000	0	0	2	3	20	0106000000000000	00	00	00000000	0	0	00000000	24	05	05
45	01	01	06	05	3	0	26	01	0000	2	00000000	0	1	3	1	60	0000000000000000	00	00	00000000	0	0	00000000	33	05	12
45	01	01	08	06	3	0	00	02	0000	3	00000000	0	0	1	3	16	0807000000000000	00	02	50300003	1	0	70000000	24	09	11
45	01	01	05	05	3	0	00	01	0000	3	00000000	0	0	1	3	19	0000000000000000	00	00	00000004	1	0	00000000	33	08	10
45	01	01	06	05	3	0	40	02	0000	3	00000000	0	0	2	3	25	0000000000000000	00	00	00000000	0	0	00000000	33	07	13
45	01	01	08	07	3	0	00	02	0000	2	00000000	0	0	3	1	20	0823000000000000	00	00	00000000	0	0	00000000	45	06	10
45	01	01	06	06	3	0	28	01	0000	3	00000000	0	0	1	3	16	0000000000000000	00	02	10000000	0	0	00000000	34	05	10
45	01	01	08	09	1	0	22	02	0000	1	00000000	0	0	3	6	00	0000000000000000	00	00	00000000	0	0	00000000	44	04	08
45	01	02	04	04	1	0	00	01	0000	1	00000000	0	0	3	6	00	0508000000000000	00	00	00000000	0	0	00000000	53	04	05
45	01	01	02	03	2	0	00	02	0000	2	00000000	0	0	1	3	33	0123000000000000	00	00	00000000	0	0	00000000	45	05	06
45	01	01	01	01	2	0	00	02	0000	0	00000000	0	0	3	3	09	0806000000000000	00	00	00000000	0	0	00000000	24	06	06
45	01	01	02	02	1	1	00	02	0000	1	00000000	0	0	3	6	00	0000000000000000	00	00	00000000	0	0	00000000	44	05	04
45	01	01	03	04	1	0	00	02	0000	1	00000000	0	0	3	6	00	0000000000000000	00	00	00000000	0	0	00000000	44	08	09
45	01	01	02	03	1	0	00	01	0700	2	00000000	0	0	2	7	00	1200000000000000	00	00	00000000	0	0	00000000	43	09	09
45	01	02	04	06	1	0	00	02	0000	1	00000000	0	0	3	6	00	1864000000000000	00	00	00000000	2	1	00000000	53	05	08
45	01	01	01	03	3	0	00	02	1700	3	00000000	0	0	1	3	14	0000000000000000	00	00	00000000	0	0	00000000	33	06	06
45	01	03	06	04	1	1	00	01	0000	1	00000000	0	0	3	6	00	0000000000000000	00	00	00000000	0	0	00000000	44	05	08
45	01	01	02	04	3	0	00	02	0000	3	00000000	0	0	1	3	23	0000000000000000	00	00	00000000	0	0	00000000	33	07	09
45	01	01	02	02	2	0	00	02	0200	3	00000000	0	0	1	3	14	0406000000000000	00	00	00000000	0	0	00000000	24	07	08
45	01	01	09	03	1	1	00	02	0000	1	00000000	0	0	3	6	00	0000000000000000	00	00	00000000	0	0	00000000	44	05	08
45	01	01	01	03	0	4	30	00	0102	0	03000000	0	0	3	0	13	1300000000000000	00	00	00000000	0	0	00000000	33	05	07
45	01	01	04	05	3	1	00	02	0000	3	00000000	0	0	1	3	23	0000000000000000	00	02	50300000	0	0	00000000	33	06	11
45	01	01	02	08	4	0	00	02	0000	2	00000000	0	0	2	3	12	0000000000000000	00	00	00000000	0	0	00000000	33	05	09
45	01	03	13	05	3	1	40	02	0000	3	00000000	0	0	2	1	22	0807000000000000	00	00	00000000	0	0	00000000	24	09	11
45	01	01	09	07	3	1	00	02	0000	3	00000000	0	0	2	1	18	0824000000000000	00	00	00000002	2	4	10000000	25	08	12

```
45 01 01 07 03 3 0 34 02 0000 3 00000000 0 0 3 1 18 0123000000000000 00 00 00000000 0 0 00000000 24 07 13
45 01 01 07 07 3 0 37 02 0100 3 00000000 0 0 1 3 22 0807000000000000 00 00 00000000 0 0 00000000 24 05 07
45 01 01 03 05 3 1 00 02 0000 3 00000000 0 1 3 2 40 0000000000000000 00 00 00000000 8 0 00000000 33 06 09
45 02 07 31 07 1 0 18 02 1700 1 00000000 0 0 3 6 00 0723000000000000 00 00 00000002 1 2 30000000 00 05 06
45 01 01 05 04 3 0 00 02 0000 3 00000000 0 0 2 1 15 0123000000000000 00 00 00000003 2 4 10000000 24 04 10
45 01 02 08 06 3 0 00 02 1700 3 00000000 0 0 2 1 15 1864000000000000 00 00 00000003 2 7 00000000 53 07 09
45 01 01 01 03 3 0 00 01 0000 2 00000000 0 0 2 5 15 0107000000000000 01 30 00000000 0 0 00000000 54 05 11
45 01 03 08 06 3 1 40 02 0000 3 00000000 0 0 2 1 19 0030700000000000 00 00 00000000 0 0 00000000 24 06 08
45 01 01 03 03 3 1 00 01 0000 3 00000000 0 0 1 5 18 0307000000000000 00 40 00000000 0 0 00000000 14 05 13
45 01 01 02 02 2 0 00 02 0000 3 00000000 0 0 3 5 14 0307000000000000 00 40 00000000 0 0 00000000 14 04 13
45 01 01 02 03 1 0 00 03 0000 1 00000000 4 0 3 6 00 0000000000000000 00 00 00000000 0 0 00000000 12 13 08
45 01 01 02 04 3 1 00 02 0000 2 00000000 0 0 2 5 22 0806000000000000 00 30 00000000 0 0 00000000 54 04 13
45 01 01 02 04 3 0 00 02 0000 3 00000000 0 0 2 1 19 0607000000000000 00 00 00000000 0 0 00000000 24 11 11
45 01 01 02 02 2 0 00 02 0000 2 00000000 0 0 2 1 20 0107000000000000 00 00 00000000 0 0 00000000 24 06 10
45 01 07 02 04 3 0 00 02 0000 3 00000000 0 0 2 3 20 0000000000000000 00 00 00000000 0 0 00000000 33 05 10
45 01 03 07 05 3 1 00 02 0000 2 00000000 0 0 2 3 15 0823000000000000 00 00 00000000 0 0 00000000 24 05 09
45 01 01 02 04 3 0 00 02 0100 3 00000000 0 0 2 3 24 0000000000000000 00 00 00000000 0 0 00000000 33 07 12
45 01 01 03 03 3 1 00 02 1700 3 00000000 0 0 2 1 19 0000000000000000 00 00 00000000 0 0 00000000 33 06 11
45 01 01 03 02 3 0 00 01 0000 3 00000000 0 0 2 1 14 0000000000000000 00 00 00000000 0 0 00000000 33 05 10
45 01 01 02 07 3 1 00 02 0000 3 00000000 0 0 1 3 20 0000000000000000 00 00 00000000 0 0 00000000 33 05 09
45 01 02 05 04 3 0 00 02 0000 3 00000000 0 0 2 1 16 0000000000000000 00 02 50300000 0 0 00000000 33 05 09
45 01 02 04 01 2 0 00 02 0000 2 00000000 0 0 2 3 13 0000000000000000 00 00 00000000 0 0 00000000 33 06 12
45 01 04 06 06 3 1 00 01 0000 3 00000000 0 0 2 3 16 0000000000000000 00 00 00000000 0 0 00000000 33 07 09
45 01 01 03 04 3 0 00 02 0000 3 00000000 0 0 2 3 21 0000000000000000 00 00 00000000 0 0 00000000 33 05 08
45 01 01 03 04 3 0 00 01 0300 2 00000000 0 0 2 3 16 0000000000000000 00 00 00000000 0 0 00000000 33 05 10
45 01 01 02 03 3 0 00 01 0000 3 00000000 0 0 2 3 23 0000000000000000 00 00 00000000 0 0 00000000 33 06 10
45 01 04 08 07 3 1 00 02 0000 3 00000000 0 0 2 3 14 0000000000000000 00 00 00000000 0 0 00000000 33 05 09
45 01 01 03 03 3 0 00 02 0000 3 00000000 0 0 1 3 19 0000000000000000 00 00 00000000 0 0 00000000 33 06 09
45 01 02 03 04 3 0 00 01 0000 3 00000000 0 0 1 3 14 0000000000000000 00 00 00000000 0 0 00000000 33 04 09
45 01 01 02 03 3 0 00 01 0000 3 00000000 0 0 1 3 17 0000000000000000 00 00 00000000 0 0 00000000 33 04 07
45 01 01 03 03 3 0 00 02 1200 3 00000000 0 0 1 3 14 0000000000000000 00 00 00000000 0 0 00000000 33 05 09
45 01 01 01 02 2 0 00 01 0000 3 00000000 0 0 1 3 15 0000000000000000 00 00 00000000 0 0 00000000 33 07 08
45 01 01 04 04 1 0 00 02 0000 1 00000000 0 0 3 6 00 0000000000000000 00 00 00000000 0 0 00000000 44 05 05
45 01 01 06 04 3 1 18 01 0000 2 00000000 0 0 2 3 10 0000000000000000 00 00 00000000 0 0 00000000 33 05 07
45 01 02 08 04 3 0 00 02 0300 2 00000000 4 0 3 1 31 0125000000000000 40 00 00000000 0 0 00000000 64 09 10
45 01 01 03 05 1 0 00 01 0000 1 00000000 0 0 3 8 00 0000000000000000 00 00 00000000 0 0 00000000 44 08 07
45 01 01 04 04 1 1 00 01 0000 1 00000000 0 0 3 6 00 0000000000000000 00 00 00000000 0 0 00000000 44 05 07
45 01 01 02 03 3 0 00 02 0000 3 00000000 0 0 1 3 13 0706000000000000 00 00 00000000 0 0 00000000 24 04 07
45 45 01 05 05 3 1 00 01 0000 3 00000000 0 0 2 3 08 0808000000000000 00 00 00000000 0 8 00000000 24 05 07
```

continued on next page

TABLE A2. — *continued*

Variable Number

				1 1	1	1	1 1	1 1	1 1 2 2	2	2 2 2 2 2 2 2 3	3	3	3	3	3 3	3 3 3 4 4 4 4 4 4 4 4 4 4 5 5	5 5	5 5	5 5 5 6 6 6 6 6	6	6	6 6 6 7 7 7 7 7	7 7	7 7	7 8
1 2 3	4 5	6 7	8 9	0 1	2	3	4 5	6 7	8 9 0 1	2	3 4 5 6 7 8 9 0	1	2	3	4	5 6	7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2	3 4	5 6	7 8 9 0 1 2 3 4	5	6	7 8 9 0 1 2 3 4	5 6	7 8	9 0
45	01	01	02	03	3	0	00	02	0000	3	00000000	0	0	1	3	21	0000000000000000	00	00	00000000	0	0	00000000	33	06	05
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45	01	01	02	03	3	0	00	01	0000	2	00000000	0	0	1	5	18	0107000000000000	00	03	00000000	0	0	00000000	54	07	13
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45	01	01	04	03	3	1	00	02	0000	2	00000000	0	0	2	3	21	0307000000000000	00	00	00000000	0	0	00000000	24	07	12
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45	01	01	03	02	3	0	00	01	1700	3	00000000	0	0	1	3	1	40805000000000000	00	00	00000000	0	0	00000000	24	04	06
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45 01 01 04 04 3 0 00 02 0000 2 00000000 0 0 2 3 13 0707000000000000 00 00 00000000 0 0 00000000 24 05 08
45 01 01 02 03 3 1 00 01 0000 3 00000000 0 0 3 1 19 0107000000000000 00 00 00000000 0 0 08000000 24 06 11
45 01 01 02 05 1 0 00 03 0700 1 00000000 0 0 3 6 00 0000000000000000 00 00 00000000 0 0 00000000 44 09 05
45 01 01 03 04 3 1 00 02 0000 3 00000000 0 0 1 3 19 0106000000000000 00 00 00000000 0 0 00000000 24 08 08
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45 01 01 03 03 3 0 00 02 0000 3 00000000 0 0 2 1 16 0906000000000000 00 00 00000000 0 0 00000000 24 08 11
45 01 01 02 04 3 1 00 02 0000 3 00000000 0 0 2 1 16 0807000000000000 00 00 25030000 0 0 00000000 24 04 10
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45 01 01 02 03 3 0 00 02 0000 3 00000000 0 0 2 3 06 0110000000000000 00 00 00000000 0 0 00000000 24 07 07
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45 01 01 03 04 3 0 00 02 0000 2 00000000 0 0 1 3 25 0000000000000000 00 00 00000000 0 0 00000000 33 06 10
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45 01 02 06 03 3 0 00 02 0100 3 00000000 0 0 2 1 15 0107000000000000 00 00 00000000 3 2 25000000 24 09 14
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45 01 01 01 03 1 0 00 01 0000 1 00000000 0 0 3 6 19 0105000000000000 00 00 00000000 0 0 00000000 00 05 05
45 01 01 02 02 2 0 00 01 0300 3 00000000 0 0 1 3 14 0000000000000000 00 00 00000000 0 0 00000000 33 06 08
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continued on next page

TABLE A2. — *continued*

Variable Number

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45	01	01	02	02	3	0	00	02	0000	2	00000000	0	0	3	1	1	80807000000000000	00	00	00000000	0	0	00000000	24	07	09
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TABLE A2. — *continued*

Variable Number

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450	1	01	05	0	6	3	1	00	02	0000	3	00000000	1	1	2	1	4	40103012500000000	15	00	00000000	0	8	00000000	13	09	13
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450	1	01	04	0	3	3	3	00	01	0000	2	00000000	0	0	3	1	1	12906000000000000	00	00	00000000	0	0	00000000	24	04	08
450	1	01	03	0	4	3	0	00	01	1200	3	00000000	0	0	1	3	2	50000000000000000	00	00	00000000	0	0	00000000	33	05	05
450	1	01	10	0	6	4	0	00	02	0000	2	00000000	0	0	2	1	1	40123000000000000	00	00	00000608	3	2	73000000	24	05	08
450	1	01	05	0	4	3	0	00	02	0000	3	00000000	0	0	2	1	1	50123000000000000	00	00	00000000	0	0	41000000	24	05	10
450	1	01	02	0	4	3	1	00	01	0000	2	00000000	0	0	1	3	2	20000000000000000	00	00	00000000	0	0	00000000	33	07	09
450	2	01	21	0	9	5	1	00	02	0000	1	00000000	0	0	3	6	0	00123290300000000	00	00	00001801	6	1	23030000	00	05	08
450	2	04	39	1	4	5	0	13	01	0000	1	00000000	0	0	3	3	1	80305000000000000	00	00	00001801	0	0	00000000	24	04	07
450	2	02	36	1	4	5	0	12	02	0100	2	00000000	0	0	2	3	2	00000000000000000	00	00	00000000	5	1	00000000	33	05	07
450	1	01	06	0	6	3	0	16	02	0000	1	00000000	0	0	2	6	0	00210000000000000	00	00	00000000	0	0	00000000	24	07	06
450	2	01	33	1	4	5	0	11	02	0000	3	00000000	0	0	2	1	0	80108000000000000	00	00	00001801	3	2	79000000	24	06	09
450	2	01	39	1	6	5	0	13	02	0100	2	00000000	0	2	3	0	7	70000000000000000	00	00	00000000	1	2	79000000	42	08	10
450	2	01	42	1	9	5	0	14	02	0000	2	00000000	0	0	1	3	1	50000000000000000	00	00	00000000	0	8	00000000	33	05	07
450	1	04	12	1	2	4	0	22	01	0000	3	00000000	0	7	1	3	1	90806000000000000	00	00	00000000	3	2	41000000	24	06	06

```
45 0 1 0101 0 3 3 0 00 02 0000 3 00000000 0 1 1 3 1 70000000000000000 00 00 25030000 0 0 00000000 33 05 07
45 0 2 0133 1 2 5 0 11 02 1200 3 00000000 0 0 1 1 1 90105000000000000 00 00 00001801 0 0 00000000 56 06 07
45 0 2 0123 0 5 5 0 08 01 0000 3 00000000 0 0 1 8 0 00000000000000000 00 00 00000000 0 0 00000000 44 04 04
45 0 2 0139 1 6 5 0 13 02 0000 3 00000000 0 0 1 3 2 92903000000000000 00 00 00000000 0 0 00000000 00 06 07
45 0 2 0130 1 2 5 0 10 01 0000 3 00000000 0 0 2 3 2 30000000000000000 00 00 00000000 2 2 79000000 33 04 05
45 0 2 0142 1 1 5 0 14 02 0000 2 00000000 0 0 1 3 1 30000000000000000 00 00 00000000 0 0 00000000 33 06 08
45 0 2 0836 1 4 5 0 12 02 0700 1 00000000 0 0 3 6 0 01200000000000000 00 00 00000000 3 1 00000000 43 09 09
45 0 2 0327 1 3 5 0 11 02 2400 2 00000000 0 0 2 1 1 40806000000000000 00 00 00001801 3 2 42000000 24 05 08
45 0 2 0145 1 8 5 0 15 02 0000 1 00000000 0 0 3 6 0 00000000000000000 00 00 00000000 6 1 00000000 44 07 09
45 0 2 0748 1 9 5 0 16 02 1700 3 00000000 0 0 1 3 3 21200000000000000 00 00 00000000 0 0 00000000 43 05 08
45 0 2 0320 1 8 4 0 13 02 0000 1 00000000 0 0 1 6 0 00232000000000000 00 00 00000000 4 1 23000000 00 04 06
45 0 2 0133 1 4 5 0 11 02 0300 2 00000000 0 0 2 1 2 00106000000000000 07 00 00001801 0 2 00000000 24 05 11
45 0 2 0136 1 6 5 0 12 02 0000 3 00000000 0 0 2 1 1 20606000000000000 00 00 00001801 2 2 69000000 24 05 07
45 0 2 0130 1 1 5 0 10 01 0000 3 00000000 0 0 1 3 0 91200000000000000 00 00 00000000 3 2 96000000 43 04 08
45 0 2 0128 1 7 5 0 14 01 0000 2 00000000 0 0 3 3 1 80000000000000000 00 00 00000000 3 1 00000000 33 04 09
45 0 1 0119 1 1 5 0 10 01 0000 3 00000000 0 0 1 3 2 10806000000000000 00 00 00001801 6 1 06000000 24 03 09
45 0 2 0136 1 5 5 0 15 02 0100 3 00000000 0 0 1 3 2 40000000000000000 00 00 00000000 0 0 00000000 33 06 0
45 0 2 0139 1 5 5 0 13 02 0000 1 00000000 0 0 3 6 0 00000000000000000 00 00 00000000 3 2 96000000 44 06 08
45 0 2 0219 2 4 5 0 18 03 0000 0 00000000 0 0 3 6 0 00000000000000000 00 00 00000000 6 1 00000000 44 08 07
45 0 2 0427 1 6 5 1 12 02 0000 3 00000000 0 0 2 1 1 10107000000000000 00 00 00001801 3 2 41000000 24 05 08
45 0 2 0638 1 6 5 0 13 02 0000 2 00000000 0 0 1 3 1 20000000000000000 00 00 00000000 3 1 00000000 33 04 08
45 0 2 0142 1 8 5 0 14 01 1200 1 00000000 0 0 3 6 0 00000000000000000 00 00 00001801 0 0 00000000 12 07 07
45 0 2 0022 1 4 5 0 12 02 0100 1 00000000 0 0 3 6 0 00000000000000000 00 00 00000000 0 0 00000000 44 06 06
45 0 2 0841 1 9 5 0 16 02 0000 0 00000000 0 0 2 1 0 80816000000000000 00 00 08230000 3 2 41000000 24 04 06
45 0 0 0136 1 7 5 0 12 01 0000 0 00000000 0 0 2 1 1 10106000000000000 00 00 00001801 0 0 00000000 24 04 09
45 0 2 0139 1 6 5 0 13 02 0000 2 00000000 0 0 2 1 1 60107000000000000 00 00 00001801 1 2 79000000 24 05 10
45 0 2 0122 1 3 5 0 10 01 0100 1 00000000 0 0 3 6 0 00721072100000000 00 00 00000000 0 0 00000000 00 05 08
45 0 2 0118 0 9 5 0 08 01 0000 2 00000000 0 0 3 3 0 90000000000000000 00 00 00000000 3 1 00000000 33 05 08
45 0 2 0131 1 7 5 0 17 01 0000 3 00000000 0 0 1 1 1 10806000000000000 00 00 00000000 4 2 73000000 24 04 12
```

APPENDIX B

LITHIC CODE AND DATA

LITHIC CODE[1]

Flaked Tools and Cores: Variable Codes

VARIABLE NUMBER	VARIABLE DESCRIPTION CODE
01	M Number (NYSM)
02	M Number Extension: consecutive numbers as needed
03	F Number (Parker's Field Number)
04	Item Weight Weight in grams, to the nearest 1 g, right justified
05	Morpho-Use Category 00 Not applicable, not a tool or implement 01 Definite tool, but too fragmentary to determine form 02 Used but apparently unworked flake 03 Unused core 04 Used core (normally hammerstone-type use) 05 Cobble tool •10-29 = unifacially (unidirectionally) worked items, in all cases including "retouched flakes"[2] 10 Uniface, too fragmentary to determine orientation 12 Thick end-worked uniface[3] 13 Thick side-worked uniface 14 Thick multiple-edge-worked uniface 20 Thin end-worked uniface 21 Thin side-worked uniface 22 Thin multiple-edge-worked uniface •30-39 = specialized tool forms, may be either unifacial (unidirectional) or bifacial (bidirectional) 30 Notch, worked deeply concave edge (spokeshave) 31 Denticulate 32 Burin 33 Graver, beak, perforator 34 Drill 35 Flaked axe 39 Eccentric, ornament (high input) •40-59 = bifacially (bidirectionally) worked items

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[1] This code provides a key to Table B1.

[2] Long axis used to determine end and side of the uniface, rather than the bulb of percussion.

[3] Thick-thin distinction = 3:1 width-thickness ratio.

40	Biface, too fragmentary to determine orientation
42	Thick biface, partially worked circumference
43	Thick biface, completely worked circumference
50	Thin biface, without obvious haft element, or other than projectile points, with partially worked circumference
51	Thin biface, with haft element, other than projectile points, with partially worked circumference
52	Thin biface, completely worked circumference, without haft element
53	Thin biface, completely worked circumference, with haft element

•60-99 = projectile points

60	Projectile point, triangular, without notches
63	Projectile point, stemmed
66	Projectile point, lanceolate, without notches
70	Projectile point, corner notched, not further specified
71	Projectile point, deeply corner notched, straight stem
72	Projectile point, corner notched, expanded base
80	Projectile point, side notched, not further specified
81	Projectile point, side notched, short base
82	Projectile point, side notched, long base
98	Projectile point, unidentified, not further specified
99	Projectile point, fragmentary

06 Item Condition

0	Indeterminate
1	Broken, unidentifiable as to orientation
2	Distal section
3	Proximal section
4	Medial section (including lateral sections)
5	Complete, or nearly complete item

07 Item Length

Length in cm to the nearest 0.1 cm, right justified

08 Item Width

Width in cm to the nearest 0.1 cm, right justified

09 Dorsal Face Evaluation[4]

0	Indeterminate
1	Core or nodule without significantly flattened sections or "faces"
2	Facially unworked **with** cortex; includes single or multiple scars from flake removals made **prior to** the existence of the study item *per se* and margins directionally worked only
3	Facially unworked **without** cortex; same as Value 2, but with no cortex
4	First stage of facial regularization (item thinning). A few flakes are removed from the face of the study item, but **cortex is still present**. Flakes are likely to be short and rather non-invasive, but some may extend significantly onto the study face.
5	Same as Value 4, above, but **no cortex** remains on the study face.

---

[4] This variable is a ranked evaluation of energy investment into facial regularization or flattening.

6 Primarily flattened face. (If both faces were so flattened, the item reduction stage could be termed "primary thinning" and the item called a "blank"). Most prominent ridges or humps have been removed; there should be a definite but irregular margin around most/all of the surface, with indication of individual platform preparation; and some scars must be invasive to or beyond the face's mid-point, but these are likely to be irregularly shaped.

7 Secondarily flattened face. (This corresponds to "secondary thinning" of a "preform.") Such facial flattening should produce rather smooth convex surfaces and fairly regular section symmetry. Many flake scars are likely to be invasive to or beyond the midpoint, inconsistent as to size, and generally wide or distally expanding in shape. The plan outline of the face is likely to be fairly regular or symmetrical.

8 Well-shaped face. (This value corresponds to many projectile points, as well as to such specialized forms as drills and scrapers.) Both plan outline and section symmetry are quite regular. Most flake scars are likely to remain somewhat variable in size, but should be consistently rather wide. Much/most of the surface's perimeter should demonstrate rather short, non-invasive shaping flakes.

9 Highly stylized face. (This value usually corresponds to extremely symmetrical, thin, very well-made projectile points). The surface is quite flattened and regular in both plan and section symmetry. Individual flake scars are also very regular in size and shape, normally rather long and narrow, with few shorter shaping flakes.

10 Ventral Face Evaluation[5]
Same values as Variable 07 above

11 Edge Production: Directionality (total item)
0 Not applicable, including unused cores
1 Selected and used edges, rather than produced, including utilized flakes and cores
2 Unidirectional flaking
3 Both unidirectional and bidirectional flaking
4 Bidirectional flaking
5 Indeterminate, too fragmentary to evaluate

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[5] Determining Dorsal and Ventral Faces
(1) If an item demonstrates on one of its faces the characteristic single flake scar surface indicating that the item was removed as a flake from a core, that face is ventral (or struck, or inner) even though it may have been further modified; the opposite face is dorsal.
(2) If any of the natural cortex surface of the stone remains **on only one** face of the item, that face is dorsal and the opposite face is ventral.
(3) Lacking either of these technical features to distinguish the two faces, a distinctly plano-convex cross-section of the item is used, in which case plano is ventral and convex is dorsal.
(4) Lacking even this distinction, a laboratory designation is made by using the labeled face as ventral; the opposite face is dorsal. If the item is not labeled on one face, a face is arbitrarily selected as ventral and labeled with a **V**.

12 Edge Production: Placement (total item)
0 Not applicable, including unused cores
1 None of the tool's edges are so produced, including utilized flakes and cores
2 Some of the tool's edges are produced by unidirectional or bidirectional flaking
3 All of the tool's edges are so produced
4 Indeterminate, too fragmentary to evaluate

13 Core Form
0: Not applicable, item is not primarily a core for the production of usable flakes
1: Unspecialized, irregular flake cores with few flake removals, usually no more than one or two irregularly shaped flakes removed from any platform area
2: Specialized, more regular cores, occasionally roughly discoidal, with several similarly shaped flakes removed from one or more platform areas
3: Stylized, very regular cores, usually rather symmetrical in total form, with many very regular flakes or blades removed from one or more well-prepared platform areas. Flake removal forces from any platform area are similarly directed.

TABLE B1. FLAKED-LITHIC DATA FROM THE PARKER COLLECTION.

Variable Number												
01	02	03	04	05	06	07	08	09	10	11	12	13
03380	0	0	2	60	5	3.0	1.7	6	7	4	3	0
03381	0	0	2	60	5	3.8	1.5	7	7	4	3	0
03382	1	211	2	60	4	3.7	1.2	6	6	4	3	0
03382	2	211	2	60	5	3.1	1.6	4	7	4	3	0
03383	0	212	1	60	5	2.5	1.6	7	7	4	3	0
03384	1	213	1	60	5	2.6	1.7	7	7	4	3	0
03384	2	214	1	60	5	3.1	1.6	7	7	4	3	0
03351	0	143	1	60	5	3.0	1.8	7	7	4	3	0
03352	0	144	1	60	5	2.9	2.0	7	7	4	3	0
03353	0	145	1	60	5	3.2	1.8	7	7	4	3	0
03354	0	148	1	60	5	2.9	1.8	7	7	4	3	0
03355	0	149	1	60	5	2.9	1.8	8	8	4	3	0
03356	0	151	1	60	5	3.1	1.9	7	7	4	3	0
03356	0	150	1	60	5	3.1	1.3	7	7	4	3	0
03357	0	152	1	60	5	2.7	1.9	7	8	4	3	0
03359	0	157	1	60	5	2.7	1.5	7	7	4	3	0
03360	0	158	1	60	5	2.6	1.4	7	7	4	3	0
03361	0	159	1	60	5	2.8	1.7	7	7	4	3	0
03362	0	160	1	60	5	2.9	1.6	7	7	4	3	0
03401	0	232	1	60	5	2.7	1.3	7	7	4	3	0
03402	0	233	2	60	5	3.1	1.6	7	7	4	3	0
03403	0	234	1	60	5	2.5	1.6	7	7	4	3	0
03404	0	235	1	60	5	3.3	1.8	7	7	4	3	0
03433	0	267	28	63	5	8.1	3.7	7	7	4	3	0
03887			3	60	5	3.7	2.0	7	7	4	3	0
03888			3	32	5	4.2	1.1	6	7	3	2	0
03889			6	43	5	3.4	2.0	5	6	1	1	0
03890			14	42	5	3.6	2.6	5	6	1	1	0
03891			5	02	5	0.0	0.0	3	3	1	1	0
03894			32	02	5	0.0	0.0	2	3	1	1	0
03895			12	43	5	3.8	2.6	5	5	1	1	0
03796		2	1	60	5	2.4	1.7	7	7	4	3	0
03897			56	03	5	0.0	0.0	1	1	0	0	1
03898			16	03	5	0.0	0.0	1	1	0	0	1
03899			2	52	2	2.9	1.5	6	7	3	2	0
04148			3	80	5	3.4	1.5	6	6	3	3	0
04161			9	02	5	0.0	0.0	3	3	1	1	0
04227			24	03	5	0.0	0.0	1	1	1	1	1
03830			18	22	5	5.2	3.2	5	3	2	3	0
03831			104	03	5	0.0	0.0	0	0	0	0	0
03832			32	03	5	0.0	0.0	2	2	0	0	1
03833			32	03	5	0.0	0.0	1	2	0	0	2
03834			37	03	5	0.0	0.0	1	1	0	0	2
03835			6	02	5	0.0	0.0	3	3	1	1	0
03836			24	03	5	0.0	0.0	1	1	0	0	0
03837			21	04	5	0.0	0.0	1	1	1	1	1
03838			10	02	5	0.0	0.0	2	3	1	1	0
03839			9	43	5	8.6	4.4	5	5	4	4	0
03841			25	34	5	6.4	3.0	6	5	4	3	0
03842			9	50	5	3.8	2.7	6	6	4	2	0
03843			8	52	5	4.6	2.6	6	7	4	3	0
03845			8	42	5	3.5	2.1	5	4	4	2	0
03846			14	52	5	3.9	3.2	4	5	2	3	0
03847			27	03	5	0.0	0.0	1	1	0	0	1
03852			5	66	5	3.3	2.3	5	6	4	3	0
03853			17	12	5	3.9	3.3	3	2	2	2	0
03854			7	4	5	3.3	2.3	6	6	1	1	0
03855			38	50	5	6.1	4.3	2	2	4	2	0
03856			11	42	5	4.4	2.4	5	5	1	1	0
03857			23	4	5	0.0	0.0	2	5	2	2	0

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TABLE B1. — *continued*

Variable Number												
01	02	03	04	05	06	07	08	09	10	11	12	13
03858			8	00	5	0.0	0.0	0	0	0	0	0
03860			6	13	5	3.0	2.5	3	3	2	2	0
03861			16	42	5	3.9	3.1	4	4	1	1	0
03862			6	99	2	2.4	1.7	7	7	3	2	0
03866			51	03	5	0.0	0.0	1	1	0	0	1
03867			21	52	5	5.0	3.2	5	6	3	3	0
03868			17	02	5	0.0	0.0	3	3	1	1	0
03869			3	99	2	3.4	1.8	8	8	3	3	0
03870			9	4	5	3.3	2.4	5	6	1	1	0
03871			10	42	5	4.1	2.4	3	3	4	2	0
03872			6	14	5	4.3	1.5	3	3	2	2	0
03873			6	02	5	0.0	0.0	2	3	1	1	0
03874			13	03	5	0.0	0.0	1	1	0	0	1
03875			2	02	5	0.0	0.0	3	3	1	1	0
03877			21	03	5	0.0	0.0	1	1	0	0	1
03878			10	43	5	4.1	2.7	5	3	3	2	0
03879			5	43	5	4.9	1.4	6	6	4	2	0
03880			5	50	5	3.1	2.3	5	5	2	2	0
03881			4	52	3	0.0	0.0	7	7	1	1	0
03882			2	02	5	0.0	0.0	3	3	1	1	0
03883			5	02	5	0.0	0.0	2	3	1	1	0
03884			6	13	5	3.1	2.4	3	2	2	2	0
03885			7	02	5	0.0	0.0	3	3	1	1	0
03885			13	03	5	0.0	0.0	1	1	0	0	1
03436		270	17	52	5	6.1	3.5	8	8	4	3	0
03472		309	6	52	5	5.2	1.6	8	7	2	3	0
03473		310	2	60	5	3.8	2.1	8	8	1	1	0
03478		315	14	63	5	6.5	2.7	6	6	1	1	0
03508		343	1	60	5	2.2	1.5	7	7	1	1	0
03516		351	10	22	5	3.8	1.9	5	3	1	1	0
03521		356	1	60	5	3.0	1.4	8	8	1	1	0
03526		362	53	14	5	6.6	4.4	5	3	2	2	0
03532		369	1	60	5	2.8	1.6	8	8	1	1	0
03571		412	32	43	5	10.1	2.6	6	6	2	2	0
03577		428	2	60	5	3.5	1.6	8	8	1	1	0
03577		429	1	60	5	3.1	1.4	8	8	1	1	0
03589		454	2	60	5	3.5	1.7	8	8	1	1	0
03589		457	1	60	5	3.2	1.6	8	8	1	1	0
03589		456	1	60	5	3.4	1.5	8	8	1	1	0
03593		461	1	60	5	2.6	1.2	7	7	1	1	0
03593		462	1	60	5	3.5	1.6	6	7	1	1	0
03593		463	1	60	5	3.2	1.4	8	8	1	1	0
03593		464	1	60	5	3.0	1.4	8	8	1	1	0
03593		465	2	60	5	3.9	2.5	7	7	1	1	0
03593		466	3	60	5	3.3	1.6	7	7	1	1	0
03593		467	2	60	5	2.9	1.4	7	7	1	1	0
03593		468	1	60	5	2.9	1.6	8	8	1	1	0
03600		486	2	60	5	3.6	1.6	8	8	1	1	0
03600		488	2	60	5	3.1	1.8	8	8	1	1	0
03600		489	1	60	5	2.3	1.3	7	7	1	1	0
03600		490	1	60	5	2.5	1.4	8	8	1	1	0
03600		491	2	60	5	3.0	1.8	8	8	2	2	0
03600		492	1	60	5	2.9	1.5	8	8	1	1	0
03602		496	19	50	5	4.7	3.7	6	3	2	2	0
03607		501	6	81	5	5.3	2.1	7	7	1	1	0
03607		504	9	63	5	5.0	2.3	6	7	1	1	0
03607		505	2	81	5	3.0	1.4	6	6	1	1	0
03618		524	18	52	5	6.7	3.5	8	8	4	3	0
03619		525	1	60	5	3.2	1.4	8	7	1	1	0
03619		526	1	60	5	3.5	1.6	8	8	1	1	0

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Table B1. — *continued*

Variable Number												
01	02	03	04	05	06	07	08	09	10	11	12	13
03612		518	1	60	5	2.7	1.6	8	8	1	1	0
03613		519	1	60	5	3.0	1.5	8	8	2	2	0
03615		523	1	60	5	3.0	1.7	8	8	4	3	0
03621		527	1	60	5	3.5	1.4	8	8	1	1	0
03622		528	1	60	5	3.0	1.6	8	8	1	1	0
03623		529	2	60	5	3.1	1.9	8	8	1	1	0
03624		550	2	60	5	3.6	1.5	7	7	1	1	0
03627		533	2	60	5	3.3	1.5	7	7	1	1	0
03628		534	2	60	5	3.0	1.8	8	8	1	1	0
03631		537	3	02	5	0.0	0.0	3	3	1	1	0
03631		538	27	02	5	0.0	0.0	2	2	1	1	0
03631		539	8	02	5	0.0	0.0	3	2	1	1	0
03631		540	22	03	5	0.0	0.0	1	1	0	0	1
03631		541	6	02	5	0.0	0.0	3	3	1	1	0
03632		542	11	14	5	4.0	2.9	5	3	2	2	0
03632		543	9	42	5	3.1	2.3	5	3	3	2	0
03632		544	19	14	5	4.6	2.5	5	3	2	2	0
03636		548	44	52	5	9.0	3.9	7	6	1	1	0
03641		621	3	34	5	4.7	1.0	8	7	2	2	0
03646		146	7	52	5	5.9	2.3	8	8	3	2	0
03646		154	22	52	5	7.7	3.0	7	7	3	2	0
03669		4461	5	00	5	0.0	0.0	0	0	0	0	0
03669		4462	9	00	5	0.0	0.0	0	0	0	0	0
03669		4463	1	00	5	0.0	0.0	0	0	0	0	0
03669		4464	3	02	5	0.0	0.0	0	0	0	0	0
03669		4465	11	03	5	0.0	0.0	3	3	0	0	1
03669		4466	7	00	5	0.0	0.0	0	0	0	0	0
03669		4467	10	13	5	3.2	2.4	3	3	2	2	0
03729			23	99	5	6.9	3.3	7	7	1	1	0
03730			35	14	5	6.0	3.5	4	3	2	2	0
03731			9	52	5	4.9	2.7	8	7	3	2	0
03759			18	03	5	0.0	0.0	1	1	0	0	1
03765			37	03	5	0.0	0.0	1	1	0	0	1
03766			22	00	5	0.0	0.0	0	0	0	0	0
03767			18	03	5	0.0	0.0	1	1	0	0	1
03768			22	03	5	0.0	0.0	1	1	0	0	1
03775			64	03	5	0.0	0.0	1	1	0	0	1
03776			18	14	5	4.6	2.8	5	3	2	2	0
03778			15	14	5	4.5	2.7	5	3	2	2	0
03779			13	63	5	6.0	2.6	7	7	1	1	0
03780			16	43	5	6.3	2.6	6	7	1	1	0
03781			17	03	5	0.0	0.0	1	1	0	0	1
03782			15	52	5	5.6	3.2	7	8	4	2	0
03774			23	52	5	5.3	3.6	7	7	3	2	0
03783			2	52	5	2.6	1.6	6	6	3	2	0
03784			1	60	5	2.8	1.7	7	7	1	1	0
03785			2	60	5	3.4	1.7	8	8	2	2	0
03786			2	60	5	3.4	1.5	8	8	2	2	0
03787			2	60	5	3.5	1.7	8	8	1	1	0
03788			2	60	5	3.3	1.7	6	6	1	1	0
03789			2	60	5	2.9	1.8	8	8	1	1	0
03790			1	60	5	3.2	1.4	7	7	1	1	0
03791			2	60	5	2.9	1.7	8	8	1	1	0
03792			6	03	5	0.0	0.0	1	1	0	0	1
03793			2	60	5	3.2	1.7	8	8	1	1	0
03794			3	02	5	0.0	0.0	3	3	1	1	0
03795			31	42	5	6.1	4.2	5	5	1	1	0
03796			3	60	5	3.6	2.1	7	7	1	1	0
03797			7	52	5	4.7	2.1	6	7	1	1	0
03601			5	43	5	4.8	1.9	6	6	4	3	0

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TABLE B1. — *continued*

Variable Number												
01	02	03	04	05	06	07	08	09	10	11	12	13
03840			3	02	5	0.0	0.0	3	3	1	1	0
04228			10	02	5	0.0	0.0	3	3	1	1	0
04229			6	02	5	0.0	0.0	3	3	1	1	0
04230			5	50	5	2.9	2.5	5	3	4	2	0
04231			5	02	5	0.0	0.0	3	3	1	1	0
04235			17	03	5	0.0	0.0	1	1	0	0	1
04236			23	03	5	0.0	0.0	1	1	0	0	1
04237			10	00	5	0.0	0.0	0	0	0	0	0
04238			8	02	5	0.0	0.0	3	3	1	1	0
04239			7	02	5	0.0	0.0	3	3	1	1	0
04240			8	00	5	0.0	0.0	0	0	0	0	0
04241			4	00	5	0.0	0.0	0	0	0	0	0
04242			6	42	5	3.3	2.4	3	3	3	2	0
04243			2	02	5	0.0	0.0	3	3	1	1	0
15508		1	5	52	5	8.1	3.9	8	8	3	3	0
15508		2	2	60	5	3.1	1.5	8	8	3	2	0
15508		3	1	60	5	2.7	1.7	8	8	3	2	0
15508		4	1	60	5	3.2	1.3	8	8	3	3	0
15508		5	2	60	5	3.5	1.5	8	8	3	3	0
15508		6	1	60	5	2.6	1.5	8	8	3	3	0
15508		7	1	60	5	3.0	1.6	7	7	3	2	0
15508		8	2	60	5	3.9	1.7	7	8	4	3	0
15508		9	2	60	5	3.7	1.5	8	8	2	2	0
15508		10	1	60	5	3.1	1.3	8	8	3	3	0
15508		11	1	60	5	3.2	1.5	8	8	4	3	0
15508		12	2	60	5	2.9	1.8	7	6	2	2	0
15508		13	1	60	5	3.0	1.5	7	7	2	2	0
15508		14	4	66	5	3.7	1.5	7	7	3	3	0
15508		15	7	80	5	4.8	2.1	6	7	3	2	0
15508		16	3	12	5	4.3	2.6	2	5	2	3	0
15508		17	4	42	5	2.8	2.3	5	5	2	2	0
15508		18	5	03	5	0.0	0.0	1	1	0	0	1
15508		19	2	03	5	0.0	0.0	1	1	0	0	1
15508		20	9	03	5	0.0	0.0	1	1	0	0	2
15508		21	1	02	5	0.0	0.0	3	3	1	1	0
15508		22	2	02	5	0.0	0.0	3	3	1	1	0
15509		1	2	60	5	2.6	1.4	7	7	3	2	0
15509		2	2	99	2	2.7	1.4	7	7	4	3	0
15538		1	6	03	5	0.0	0.0	1	1	0	0	1
15538		2	3	03	5	0.0	0.0	1	1	0	0	1
15538		3	5	03	5	0.0	0.0	1	1	0	0	1
15538		4	6	03	5	0.0	0.0	1	1	0	0	2
15538		5	2	03	5	0.0	0.0	1	1	0	0	1
15538		6	1	40	2	3.4	3.1	5	5	2	2	0
15538		7	1	42	5	3.7	2.5	5	5	1	1	0
15538		8	4	99	3	2.0	2.3	6	6	3	2	0
15538		9	6	42	2	2.9	2.3	6	3	4	3	0
15538		10	4	43	5	4.5	2.4	5	6	1	1	0
15538		11	6	42	5	5.6	3.8	2	3	4	2	0
15538		12	9	00	5	0.0	0.0	0	0	0	0	0
15538		13	5	02	5	0.0	0.0	3	3	1	1	0
15538		14	5	02	5	0.0	0.0	3	3	1	1	0
15538		15	3	02	5	0.0	0.0	3	3	1	1	0
15544			2	60	5	2.9	2.0	6	5	1	1	0
15553		1	6	03	5	0.0	0.0	2	3	4	2	0
15553		2	6	03	5	0.0	0.0	1	1	0	0	1
15553		3	0	42	5	3.2	3.1	5	5	1	1	0
15553		4	1	03	5	0.0	0.0	3	3	0	0	2
15553		5	0	43	5	4.1	2.8	5	4	3	2	0
15553		6	2	02	5	0.0	0.0	3	3	1	1	0

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Table B1. — *continued*

Variable Number												
01	02	03	04	05	06	07	08	09	10	11	12	13
15556		1	7	13	5	4.9	2.7	2	3	2	2	0
15556		2	4	43	5	4.9	2.7	6	6	1	1	0
15556		3	2	33	5	2.4	2.2	6	6	1	1	0
15556		4	1	72	5	2.2	1.4	7	7	3	3	0
15574			52	80	5	12.9	4.4	8	8	4	3	0
15575			31	52	5	10.9	7.6	8	8	4	3	0
15576		1	1	60	5	3.1	1.8	8	8	3	2	0
15576		2	1	60	5	2.5	1.7	8	8	4	3	0
15576		3	2	60	5	3.7	1.8	8	8	3	2	0
15576		4	2	60	5	3.5	2.0	8	8	4	2	0
15576		5	1	60	5	2.4	1.5	8	8	4	2	0
15576		6	2	60	5	2.9	1.6	8	7	4	2	0
15576		7	3	60	5	3.3	1.6	8	7	3	2	0
15577			2	60	5	3.3	1.7	8	8	4	3	0
15578		1	3	00	5	3.9	2.7	3	3	1	1	0
15578		2	3	60	3	2.7	2.0	7	7	3	2	0
15578		3	5	99	2	3.3	2.8	7	7	1	1	0
15578		45		52	5	2.7	2.7	7	8	1	1	0
15578		5	7	63	5	3.6	2.7	6	6	1	1	0
15578		6	5	99	2	3.3	2.0	7	8	3	2	0
15581			8	63	5	4.4	2.6	7	8	2	2	0
15582		1	2	60	5	3.0	1.8	8	8	3	2	0
15582		2	1	60	5	2.6	1.5	8	8	3	2	0
15582		3	2	60	5	2.8	1.6	7	8	1	1	0
15582		4	4	43	5	2.6	2.4	6	5	3	2	0
15582		5	1	60	3	1.8	2.0	6	6	1	1	0
15582		6	2	60	3	2.7	1.5	7	7	1	1	0
15580		11	52		5	6.8	3.2	8	8	4	3	0
15584		1	48	00	5	0.0	0.0	0	0	0	0	0
15584		2	22	13	5	4.7	2.9	2	3	2	2	0
15584		3	40	03	5	0.0	0.0	1	1	0	0	1
15584		4	24	03	5	0.0	0.0	1	1	1	1	1
15584		5	15	03	5	3.6	2.7	1	1	0	0	1
15584		6	31	03	5	0.0	0.0	1	1	0	0	1
15584		7	25	02	5	0.0	0.0	2	3	1	1	0
15584		8	15	42	5	4.1	3.2	3	4	3	2	0
15584		9	26	03	5	0.0	0.0	1	1	0	0	1
15584		10	31	03	5	0.0	0.0	1	1	0	0	1
15584		11	30	02	5	0.0	0.0	2	3	1	1	0
15584		12	21	03	5	0.0	0.0	1	1	0	0	1
15584		13	23	03	5	0.0	0.0	1	1	0	0	1
15584		14	17	03	5	0.0	0.0	1	1	0	0	1
15584		15	20	02	5	0.0	0.0	2	3	1	1	0
15584		16	28	03	5	0.0	0.0	1	1	0	0	1
15584		17	9	03	5	0.0	0.0	1	1	0	0	1
15584		18	7	02	5	0.0	0.0	3	3	1	1	0
15584		19	3	02	5	0.0	0.0	3	3	1	1	0
15584		20	2	02	5	0.0	0.0	3	3	1	1	0
15584		21	2	02	5	0.0	0.0	3	3	1	1	0
15585		1	9	02	5	0.0	0.0	3	3	1	1	0
15585		2	24	02	5	0.0	0.0	3	3	1	1	0
15585		3	12	02	5	0.0	0.0	3	3	1	1	0
15585		4	21	02	5	0.0	0.0	3	3	1	1	0
15585		5	36	03	5	0.0	0.0	1	1	0	0	1
15585		6	21	0	5	0.0	0.0	3	3	1	1	0
15585		7	12	02	5	0.0	0.0	3	3	1	1	0
15585		8	63	03	5	0.0	0.0	1	1	0	0	1
15585		9	17	02	5	0.0	0.0	3	3	1	1	0
15585		10	6	02	5	0.0	0.0	3	3	1	1	0
15585		11	4	0	5	0.0	0.0	3	3	1	1	0

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TABLE B1. —*continued*

Variable Number												
01	02	03	04	05	06	07	08	09	10	11	12	13
15585		12	4	02	5	0.0	0.0	3	3	1	1	0
15585		13	2	02	5	0.0	0.0	3	3	1	1	0
15585		14	3	02	5	0.0	0.0	3	3	1	1	0
15585		15	4	02	5	0.0	0.0	3	3	1	1	0
15585		16	2	02	5	0.0	0.0	3	3	1	1	0
15585		17	2	02	5	0.0	0.0	3	3	1	1	0
15585		18	1	02	5	0.0	0.0	3	3	1	1	0
15585		19	1	02	5	0.0	0.0	3	3	1	1	0
15585		20	2	02	5	0.0	0.0	3	3	1	1	0
15585		21	1	02	5	0.0	0.0	3	3	1	1	0
15585		22	22	03	5	0.0	0.0	1	1	0	0	1
15585		23	5	03	5	0.0	0.0	1	1	0	0	1
15585		24	1	02	5	0.0	0.0	3	3	1	1	0
15585		25	2	02	5	0.0	0.0	3	3	1	1	0
15585		26	2	02	5	0.0	0.0	3	3	1	1	0
15585		27	1	02	5	0.0	0.0	3	3	1	1	0
15585		28	1	02	5	0.0	0.0	3	3	1	1	0
15619		11		42	2	3.9	3.1	4	5	2	2	0
15621		1	1	60	3	2.1	1.4	7	7	2	2	0
15621		2	6	98	5	3.8	2.2	6	6	2	2	0
15621		3	11	02	5	0.0	0.0	3	3	1	1	0
15622		1	43	52	5	9.1	4.7	8	8	4	3	0
15622		2	25	52	5	7.6	4.2	8	8	4	3	0
15622		3	34	52	5	9.9	4.2	8	9	4	3	0
15623			11	52	5	6.5	2.6	8	8	3	3	0
03839			47	52	5	4.4	2.0	7	7	3	2	0
03859		1	32	03	5	0.0	0.0	3	2	0	0	1
03859		2	22	03	5	0.0	0.0	3	2	0	0	1
03865			33	02	5	0.0	0.0	3	3	1	1	0
03876			3	60	5	3.5	2.8	8	8	3	2	0
03897			4	99	5	3.3	2.3	7	7	1	1	0
03900			1	60	5	2.9	1.6	8	8	2	2	0
03902			7	42	5	3.3	2.2	5	5	1	1	0
03903			7	00	5	0.0	0.0	0	0	0	0	0
38455		1	6	00	5	0.0	0.0	0	0	0	0	0
38455		2	12	02	5	0.0	0.0	2	3	1	1	0
38455		3	13	00	5	0.0	0.0	0	0	0	0	0
38455		4	12	00	5	0.0	0.0	0	0	0	0	0
38455		5	15	03	5	0.0	0.0	1	1	0	0	1
38455		6	14	03	5	0.0	0.0	1	1	0	0	1
38455		7	4	02	5	0.0	0.0	3	3	1	1	0
38455		8	5	00	5	0.0	0.0	0	0	0	0	0
38455		9	2	00	5	0.0	0.0	0	0	0	0	0
38455		11	10	00	5	0.0	0.0	0	0	0	0	0
38455		12	1	00	5	0.0	0.0	0	0	0	0	0
38455		13	1	00	5	0.0	0.0	0	0	0	0	0
38455		14	2	00	5	0.0	0.0	0	0	0	0	0
38455		15	2	00	5	0.0	0.0	0	0	0	0	0
38455		16	4	43	5	2.6	1.9	6	5	1	1	0
38455		17	3	00	5	0.0	0.0	0	0	0	0	0
38455		18	5	03	5	0.0	0.0	1	1	0	0	1
38455		19	1	00	5	0.0	0.0	0	0	0	0	0
38455		20	3	00	5	0.0	0.0	0	0	0	0	0
38455		21	6	00	5	0.0	0.0	0	0	0	0	0
38455		22	2	02	5	0.0	0.0	3	3	1	1	0
38455		23	6	00	5	0.0	0.0	0	0	0	0	0
38455		24	5	00	5	0.0	0.0	0	0	0	0	0
38455		25	9	03	5	0.0	0.0	3	3	0	0	1
38455		26	3	02	5	0.0	0.0	3	3	1	1	0
38455		27	4	02	5	0.0	0.0	3	3	1	1	0

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Table B1. — *continued*

Variable Number												
01	02	03	04	05	06	07	08	09	10	11	12	13
38455		28	1	00	5	0.0	0.0	0	0	0	0	0
38455		29	3	02	5	0.0	0.0	3	3	1	1	0
38455		30	1	00	5	0.0	0.0	0	0	0	0	0
38455		31	1	02	5	0.0	0.0	3	3	1	1	0
38449			2	60	5	2.5	2.3	8	8	3	2	0
15580			41	52	5	9.7	4.6	8	8	4	3	0
00001		1	5	60	5	3.8	2.3	7	7	1	1	0
00001		2	1	99	5	2.1	1.1	8	8	1	1	0
00001		3	2	60	5	2.9	1.8	8	8	1	1	0
00001		4	2	60	5	2.9	1.6	7	7	1	1	0
00001		5	6	70	5	4.3	2.4	8	8	3	2	0
00002			1	60	5	2.2	1.5	7	7	1	1	0

APPENDIX C

BURIAL CODE AND DATA

RIPLEY SITE BURIAL CODE[1]

VARIABLE		KEY
1	Burial number	Harrington collection: 1-2 digit number from notes plus letter designation for multiple burial Parker collection: 1-3 digit number from report plus letter designation for multiple burial Christensen collection: 1-2 digit arbitrary number assigned to each individual Conklin collection: 1-2 digit arbitrary number assigned to each individual
2	Pit number	Harrington collection: 1-2 digit number from notes Parker collection: 1-3 digit number from report Christensen collection: 1-2 digit number from notes Conklin collection: letter designation from report
3	M number	Peabody Museum catalog number for skeleton (Harrington collection only)
4	Age	0 fetal 1 infant (1-10 yrs) 2 child (11-15 yrs) 3 juvenile (16-20 yrs) 4 young adult (21-30 yrs) 5 mature adult (31-40 yrs) 6 old adult (> 40 yrs) 7 indeterminate subadult 8 indeterminate adult 9 indeterminate
5	Sex	1 male 2 female 9 indeterminate
6	Multiple burial	0 no 1 yes
7	Orientation (direction skull is headed)	1 north 2 northeast 3 east 4 southeast 5 south

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[1] This code provides a key to Tables C1 through C4.

		6	southwest
		7	west
		8	northwest
		9	indeterminate
		0	other
8	Face (direction skull is facing)	as Number 7 above	
9	Side (side burial is lying on)	1	right
		2	left
		9	indeterminate
10	Funerary objects	0	none associated
		1	associated
11	Funerary objects position	0	none
		1	near skull/head
		2	near shoulder or arm
		3	front midsection (near sternum/knees/legs/abdomen)
		4	back midsection (at lumbar vertebrae/torso)
		5	end of grave/near feet
		6	within pot/pipe
		7	on arm or hand/around neck
		8	inflicted
		9	unknown
		10	multiple positions
12	Pots	0	none associated
		1	associated
13	Pot position	0	none
		1	near skull/head
		2	near shoulder or arm
		3	front midsection
		4	back midsection
		5	end of grave/near feet
		6	within pot/pipe
		7	on arm or hand/around neck
		8	inflected
		9	unknown
14	Projectile points	0	none associated
		1	associated
15	Projectile point position	as Number 13 above	
16	Group of projectile points (>2)	0	none associated
		1	associated
17	Group of projectile points position	as Number 13 above	
18	Pipes	0	none associated
		1	associated
19	Pipe position	as Number 13 above	
20	Debitage ("flakes and chips")	0	none associated
		1	associated
21	Debitage position	as Number 13 above	
22	Celts/ground stone tools	0	none associated
		1	associated

23	Celt position	as Number 13 above
24	Chipped stone tools (other than projectile point)	0 none associated 1 associated
25	Chipped stone	as Number 13 above
26	Red ocher	0 none associated 1 associated
27	Red ocher position	as Number 13 above
28	Mineral/paint other than red ocher	0 none associated 1 associated
29	Mineral/paint position	as Number 13 above
30	Glass beads	0 none associated 1 associated
31	Glass beads position	as Number 13 above
32	Copper or brass artifacts	0 none associated 1 associated
33	Copper or brass artifacts position	as Number 13 above
34	Botanical materials as grave "liner" or covering	0 none associated 1 associated
35	Botanical materials other than above	0 none associated 1 associated
36	Botanical materials (Number 35) position	as Number 13 above
37	Cut bear maxilla	0 none associated 1 associated
38	Cut bear maxilla position	as Number 13 above
39	Turtle carapace	0 none associated 1 associated
40	Turtle carapace position	as Number 13 above
41	Beaver teeth	0 none associated 1 associated
42	Beaver teeth position	as Number 13 above
43	Bone tubes	0 none associated 1 associated
44	Bone tubes position	as Number 13 above
45	Bone awls/tools	0 none associated 1 associated
46	Bone awls/tools position	as Number 13 above
47	Bone or shell refuse	0 none associated 1 associated
48	Bone or shell refuse position	as Number 13 above
49	Shell or bone beads	0 none associated 1 associated

50	Shell or bone beads position	as Number 13 above
51	Shell gorget/pendant	0 none associated 1 associated
52	Shell gorget/pendant position	as Number 13 above
53	Other shell or bone ornament	0 none associated 1 associated
54	Other shell or bone position	as Number 13 above
55	Metal artifact (other than copper or brass)	0 none associated 1 associated
56	Metal artifact position	as Number 13 above
57	Miscellaneous/ indeterminate	0 none associated 1 associated
58	Miscellaneous/ indeterminate position	as Number 13 above

Table C1. Data from Burials Excavated by Harrington.

Variable Number

				1 1 1 1 1 1	1 1 1 1 2 2 2 2 2 2	2 2 2 2 3 3 3 3 3 3	3 3 3 3 4 4 4 4 4 4	4 4 4 4 5 5 5 5 5 5 5 5 5
1	2	3	4 5	6 7 8 9 0 1 2 3 4 5	6 7 8 9 0 1 2 3 4 5	6 7 8 9 0 1 2 3 4 5	6 7 8 9 0 1 2 3 4 5	6 7 8 9 0 1 2 3 4 5 6 7 8
1	1	58161	5 1	0 9 9 9 1 9 1 9 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0
2	2	?	9 1	0 9 3 2 1 4 0 0 1 4	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0
3	3	?	1 9	0 9 9 9 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0
4	4	58162	1 9	0 3 9 9 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0
5	5	58163	4 2	0 6 1 2 1 10 1 1 0 0	0 0 0 0 0 0 0 0 0 0	1 1 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 1	4 0 0 0 0 0 0 0 0 0 0 0 0
6	6	58164	4 1	0 3 9 1 1 10 1 1 0 0	0 0 0 0 0 0 0 0 1 5	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0
7	7	58165	4 2	0 9 3 2 1 9 1 9 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 1 6 0 0 0 0 0 0 0 0 0 0
9	9	58166	5 2	0 3 1 2 1 9 1 9 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 1 6 0 0 0 0 0 0 0 0 0 0
10	10	?	9 9	0 9 1 9 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0
11	11	58167	4 2	0 3 5 1 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0
12	12	58168	1 9	0 9 1 9 1 1 1 1 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 1 1 0 1	1 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0
13	13	?	1 9	0 3 1 2 1 9 1 9 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0
14	14	58169	1 9	0 7 5 9 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0
19	19	58170	3 2	0 3 1 2 1 2 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 1 2 0 0 0 0 0 0 0 0
36	36	58171	1 9	0 2 5 9 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0
48A	48	58172	6 2	1 3 1 2 1 5 0 0 0 0	0 0 0 0 0 0 0 0 0 0	1 5 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0
48B	48	58173	3 2	1 3 5 1 1 1 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 1 1 0 0 0 0 0 0 0 0
49A	49	58174	6 2	1 7 9 1 1 1 0 0 0 0	0 0 0 0 0 0 1 1 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0
49B	49	58175	1 1	1 8 8 2 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0
50	50	58176	4 1	0 4 7 1 1 10 1 1 1 2	1 1 0 0 0 0 1 1 1 1	1 1 1 1 0 0 0 0 0 1	9 0 0 0 0 0 0 0 0 1	1 1 1 0 0 0 0 1 2 1 1 0 0
52A	52	58178	4 2	1 3 1 2 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0
52B	52	58179	5 1	1 3 1 2 1 10 1 1 1 1	0 0 0 0 1 1 0 0 0 0	1 1 0 0 0 0 0 0 0 1	6 1 1 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0
52C	52	58177	0 9	1 9 9 9 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0
53A	53	58180	5 2	1 5 3 2 1 10 1 3 1 3	0 0 0 0 0 0 0 0 0 0	0 0 0 0 1 7 0 0 1 0	0 0 0 0 0 0 0 0 0 1	2 0 0 1 7 0 0 0 0 0 0 0 0
53B	53	58181	6 1	1 5 3 2 1 1 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 1 1 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0
53C	53	58182	4 2	0 5 7 1 1 4 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 1	4 0 0 0 0 0 0 0 0 0 0 0 0
54	54	59183	4 1	0 5 3 2 1 1 1 1 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0
55	55	58184	5 1	0 3 1 2 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0
56	56	NONE	6 9	0 7 1 1 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0
57	57	58185	6 2	0 3 1 2 1 1 1 1 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0
58	58	58186	2 2	0 3 1 2 1 3 0 0 0 0	0 0 0 0 0 0 0 0 0 0	1 3 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0
59	59	?	9 1	0 4 2 2 1 10 1 4 0 0	1 1 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 1 1 0 0 0 0
60	60	58187	4 2	0 5 7 1 1 1 1 1 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0
62	62	?	1 9	0 5 3 2 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0
64	64	58188	0 9	0 7 9 9 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0
66	66	58189	6 1	0 5 7 1 1 10 0 0 1 1	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 1	4 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0
68A	68	58191	5 2	1 3 5 1 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0
68B	68	58190	0 9	1 9 9 9 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0

Table C2. Data from Burials Excavated by Parker.

Variable Number

			111111	1111222222	2222333333	3333444444	4444555555555
1	23	45	67890 12345	6789012345	6789012345	6789012345	6789012345678
1	4	99	05311 11100	0000000000	0000000000	0000000000	0000000000000
2	5	99	09990 00000	0000000000	0000000000	0000000000	0000000000000
3	6	99	01310 00000	0000000000	0000000000	0000000000	0000000000000
4	7	52	05310 00000	0000000000	0000000000	0000000000	0000000000000
5	8	99	01710 00000	0000000000	0000000000	0000000000	0000000000000
6	9	51	04211 10000	0011000000	0000000001	6000000000	0000000000000
7	10	81	09991 10000	0000110011	0011000000	0000000000	0000000000000
8	11	51	01711 11100	0000001100	1100000001	9000000000	0000000000000
9	12	29	05720 00000	0000000000	0000000000	0000000000	0000000000000
10	13	99	05720 00000	0000000000	0000000000	0000000000	0000000000000
11	14	41	01311 11100	0000000000	0011000010	0000000190	0000000000000
12	15	51	02811 101100	0000000000	0000000000	0000000000	0000000000000
13	22	19	05311 11100	0000000000	0000000000	0000000000	0000000000000
14	23	82	05311 11100	0000000000	0000000000	0000000000	0000000000000
15	24	89	09990 00000	0000000000	0000000000	0000000000	0000000000000
16	25	99	09990 00000	0000000000	0000000000	0000000000	0000000000000
17	33	99	09991 91900	0000000000	0000000000	0000000000	0000000000000
18	39	41	08611 101118	0000000000	0000140000	0000000000	0000000000000
19	40	89	03111 11100	0000000000	0000000000	0000000000	0000000000000
20	44	51	05721 10000	0011000000	0000000010	0110000000	0000000000000
21	45	82	05311 10000	0019000000	0000000000	0000000000	0001700000000
22	47	82	03521 11100	0000000000	0000000010	0000000000	0000000000000
23	48	82	03521 11100	0000000000	0000000001	9000000000	0000000000000
24	49	99	09990 00000	0000000000	0000000000	0000000000	0000000000000
25	51	61	05311 11100	0011000000	0000000000	0000000000	0000000000000
26	52	99	03511 11100	0000000000	0000000000	0000000000	0000000000000
27	54	99	09990 00000	0000000000	0000000000	0000000000	0000000000000
29	57	99	09991 91900	0000000000	0000000000	0000000000	0000000000000
30	58	99	03111 11100	0000000000	0000000000	0000000000	0000000000000
31	59	79	09991 91900	0000000000	0000000000	0000000000	0000000000000
33	61	99	09991 91900	0000000000	0000000000	0000000000	0000000000000
34	62	29	09991 61900	0016000000	0000000001	6000000000	0000000000000
35	63	61	04211 10000	1100110011	1100000000	0000000000	0000000001100
36	64	99	03111 91900	1900000000	0000000000	0000000000	0000000000000
37	65	82	06811 11100	0000000000	0000000000	0000000000	0000000000000
38	67	82	04211 11100	0000000000	0000000000	0000000000	0000000000000
39	68	19	03110 00000	0000000000	0000000000	0000000000	0000000000000
41	86	81	03111 11100	0011001111	0000000000	0000011001	1000000001100
42	87	19	09991 11100	0000000000	0000000000	0000000000	0000000000000
43	88	99	09991 91900	0000000000	0000000000	0000000000	0000000000000
44	89	89	05720 00000	0000000000	0000000000	0000000000	0000000000000
45	90	89	05720 00000	0000000000	0000000000	0000000000	0000000000000
46	91	89	03111 91900	0000000000	0000000010	0000000000	0000000000000
47	92	61	03121 101100	0014001100	0000000000	0000000000	0000000000000
48	93	79	06410 00000	0000000000	0000000000	0000000000	0000000000000
49A	94	89	13111 11100	1100000000	0000000000	0000000000	0000000000000

49B	94	89	14211 10000	0000000011	0000000000	0000000000	0000000000000
50	95	99	09991 91900	0000000000	0000000000	0000000000	0000000000000
51A	96	62	13521 11100	0000000000	1700001700	0000000000	0000000000000
51B	96	29	13521 91900	0000000000	0000000000	0000000000	0000000000000
51C	96	29	13521 11100	0000000000	0000000010	0000000000	0000000000000
51D	96	81	19911 40000	1400001900	0000000000	0000000000	0000000000000
52	97	92	09990 00000	0000000000	0000000000	0000000000	0000000000000
53	98	62	05721 11100	0000000000	0000000000	0000000000	0000000000000
54	99	89	07520 00000	0000000000	0000000000	0000000000	0000000000000
55	100	81	05721 11100	0000001100	0000000000	0000000000	0000000000000
56	101	82	03111 11100	0000000000	0000000000	0000000000	0000000000000
57	102	81	01321 11100	0000000000	0000000000	0000000000	0000000000000
58	103	89	01321 11100	0000000000	0000000000	0000000000	0000000000000
59	104	99	09990 00000	0000000000	0000000000	0000000000	0000000000000
60	105	99	09991 91900	0019000000	0000000000	0000000000	0000000000000
61	106	99	99991 91900	0000000000	0000000000	0000000000	0000000000000
62	107	51	06411 11100	1800000000	0000000000	0000000000	0000000000000
63	109	89	03520 00000	0000000000	0000000000	0000000000	0000000000000
64	110	99	03521 11100	0000000000	0000000000	0000000000	0000000000000
65	111	99	03520 00000	0000000000	0000000010	0000000000	0000000000000
66	112	82	03111 21200	0000000000	0000000000	0000000000	0000000000000
67	113	99	07511 11100	0000000000	1100000000	0000000000	0000000000000
69A	114	82	17511 91900	0000000000	1900000000	0000000000	0000000000000
69B	114	79	17511 91900	0000000000	1900000000	0000000000	0000000000000
70A	115	82	12420 00000	0000000000	0000000000	0000000000	0000000000000
70B	115	79	12420 00000	0000000000	0000000000	0000000000	0000000000000
70C	115	79	12420 00000	0000000000	0000000000	0000000000	0000000000000
71	116	81	01711 100000	1100130000	1100000000	0000013001	3000000000000
72	117	61	04621 101100	1100111200	0000000000	0001113000	0000000001100
73A	118	99	16410 00000	0000000000	0000000000	0000000000	0000000000000
73B	118	99	12420 00000	0000000000	0000000000	0000000000	0000000000000
74A	119	99	19991 11100	0000000000	0000000000	0000000000	0000000000000
74B	119	99	19991 11100	0000000000	0000000000	0000000000	0000000000000
75	120	81	07511 40000	0011000000	0000000000	0000000000	0000000000000
76	121	81	09991 30000	1300130013	0000000000	0000000000	0000000000000
78A	123	42	13520 00000	0000000000	0000000000	0000000000	0000000000000
78B	123	42	13521 11100	0000000000	0000000000	0000000000	0000000000000
78C	123	99	99991 10000	0000000011	0000000000	0000000000	0000000000000
79	124	81	07510 00000	0000000000	0000000000	0000000000	0000000000000
80	125	79	09990 00000	0000000000	0000000010	0000000000	0000000000000
81A	126	51	14621 11100	0000190000	1900000000	0000000000	0000000000000
81B	126	51	12811 101118	0000190000	1900000000	0000000000	0000000000000
81C	126	99	99990 00000	0000000000	0000000000	0000000000	0000000000000
82	127	81	05721 11100	0000000000	0000000000	0000000000	0000000000000
83	128	82	03121 11100	0000000000	0000000000	0000000000	0000000000000
89A	129	82	14010 00000	0000000000	0000000000	0000000000	0000000000000
89B	129	82	14210 00000	0000000000	0000000000	0000000000	0000000000000
90	130	82	04211 70000	0000000000	0000001701	9000000000	0000000000019
91	131	82	03111 101100	0000000000	0000000000	0000000000	0160000000000
92	132	82	04691 10000	0000001100	0000000000	0000000000	0000000000000
93	133	82	05721 101100	0000190011	1111001710	0000000000	0001717111100
94	134	82	05311 11100	0000000000	0000000000	0000000000	0000000000000
95A	135	81	14621 91100	1100110011	0000000000	0000000000	0000000000000

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TABLE C2. — *continued*

				Variable Number			
1	23	45	111111 67890 12345	1111222222 6789012345	2222333333 6789012345	3333444444 6789012345	4444555555555 6789012345678
95B	135	82	15091 91100	1100110011	0000000000	0000000000	0000000000000
96	136	99	04920 00000	0000000000	0000000000	0000000000	0000000000000
97	137	82	03510 00000	0000000000	0000000000	0000000000	0000000000000
98A	138	81	15311 90000	1900000000	1900000000	0000000000	0000000000000
98B	138	82	14621 90000	1900000000	1900000000	0000000000	0000000000000
99	139	89	03521 101118	1100000011	1400001500	0150000000	0000000000000
100	140	81	03521 11100	1111000000	0000000000	0000000000	0000000000000
101	141	81	03511 11100	0012000000	0000000000	0000000000	0000000000000
102	142	29	03521 11100	0000000000	0000000000	0000000000	0000000000000
103A	143	82	13111 10000	0000000000	1100000000	0000000000	0000000000000
103B	143	79	13110 00000	0000000000	0000000000	0000000000	0000000000000
104	144	81	01111 10000	1100000000	0000000000	0000000000	0000000000000
106	146	82	08611 11100	0000000000	0000000000	0000000000	0000000000000
107A	147	82	19991 91900	0000000000	0000000000	0000000000	0000000000000
107B	147	79	19990 00000	0000000000	0000000000	0000000000	0000000000000

Table C3. Data from Burials Excavated by Christenson.

Variable Number

			1 11 111	1 11122222 2	2222333 333	33 3344 4444	44 44555555555
1	2 3	4 5	67890 12 345	6 78901234 5	6789012 345	67 8901 2345	67 89012345678
1	0	99	11990 00 000	0 00000000 0	0000000 000	00 0000 0000	00 00000000000
2	0	99	11990 00 000	0 00000000 0	0000000 000	00 0000 0000	00 00000000000
3	1	89	09990 00 000	0 00000000 0	0000000 000	00 0000 0000	00 00000000000
4	6	81	19911 11 100	0 00000000 0	0000000 000	00 0000 0000	00 00000000000
5	6	81	19990 00 000	0 00000000 0	0000000 000	00 0000 0000	00 00000000000
6	6	62	19990 00 000	0 00000000 0	0000000 000	00 0000 0000	00 00000000000
7	8	99	09991 11 100	0 00000000 0	0000000 000	00 0000 0000	00 00000000000
8	11	99	05991101 111	0 00011000 0	0000000 000	01 1110 0000	00 00000011113
9	12	51	05721 11 100	1 10000001 1	1100000 000	01 1000 0001	10 00000000000
10	15	99	14991 11 100	0 00000000 0	0000000 000	00 0000 0000	00 00000000000
11	15	99	14990 00 000	0 00000000 0	0000000 000	00 0000 0000	00 00000000000
12	16	99	05311 11 100	0 00000000 0	0000000 000	00 0000 0000	00 00000000000
13	17	19	03111 11 100	0 00000000 0	0000000 000	00 0000 0000	00 00000000000
14	18	82	04621 10 000	0 00000111 1	0000000 000	00 0000 0000	00 00000000000
15	19	82	07511101 100	0 00000000 0	0000000 000	00 0000 0000	01 60000000000
16	21	99	03521 11 100	1 10011111 1	0000000 000	01 1000 0000	00 00000001100
17	22	79	09990 00 000	0 00000000 0	0000000 000	00 0000 0000	00 00000000000
18	23	79	09991 11 100	0 00000000 0	0000000 000	00 0000 0000	00 00000000000
19	24	42	05310 00 000	0 00000000 0	0000000 000	00 0000 0000	00 00000000000
20	25	42	05721 11 100	0 00000000 0	0000000 000	00 0000 0000	00 00000000000
21	26	79	01711 11 100	0 00000000 0	0000000 000	00 0001 1000	00 00000000000
22	27	99	14211101 100	0 00000001 2	0000000 000	00 000110000	00 01200001100
23	27	99	14621 11 111	0 00000000 0	1100000 000	00 0000 0000	00 00000000000
24	27	99	14211101 114	0 00000001 1	1100000 000	00 0001 1001	11 10000001100
25	28	99	04211 11 100	0 00000000 0	0000000 000	00 0000 0000	00 00000000000
26	29	99	031111011000	0 00000000 0	0000000 000	00 0000 0000	00 00000000000
27	30	49	03521101 300	0 00000000 0	0000001 700	00 0000 0000	00 00000000000
28	31	99	05721 11 100	0 00000000 0	0000000 000	00 0000 0000	00 00000000000
29	32	99	09991 70 000	0 00000000 0	0000001 700	00 0000 0000	00 00000000000
30	33	99	06821101 100	1 1001100110	00000011000	0110001 9001	1110000191100
31	34	99	06821 31 300	0 00000000 0	0000000 000	00 0000 0000	00 00000000000
32	35	99	09991 91 900	0 00000000 0	0000000 000	00 0000 0000	00 00000000000
33	36	99	039911011000	1101311001 3	1300000 000	00 0000 0000	00 00000000000
34	37	99	04991 11 100	0 00000000 0	0000000 000	00 0000 0000	00 00000000000
35	38	99	05311 11 100	0 00000110 0	0000000 000	00 0000 0000	00 00000000000
36	39	99	04991 11 100	0 00000110 0	0000000 000	00 0000 0000	00 00000000000
37	40	99	09991 11 100	0 00000000 0	0000000 000	00 0000 0000	00 00000000000
38	41	19	09991 11 100	0 00000000 0	0000000 000	00 0000 0000	00 00000000000
39	43	99	03521 11 100	0 00000000 0	0000000 000	00 0000 0000	00 00000000000
40	44	99	03111101 100	0 0000000110	0000000 000	00 0000 0000	00 00000000000
41	46	99	09991 91 900	0 00000190 0	0000000 000	00 0000 0000	00 00000001900
42	47	89	19991 00 000	1 00000001 0	0000000 000	00 0000 0000	01 00000000000
43	47	89	19990 00 000	0 00000000 0	0000000 000	00 0000 0000	00 00000000000
44	47	79	19990 00 000	0 00000000 0	0000000 000	00 0000 0000	00 00000000000
45	48	99	02991 10 000	0 00011000 0	0000000 000	00 0000 0000	00 00000000000
46	47	79	16990 00 000	0 00000000 0	0000000 000	00 0000 0000	00 00000000000

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TABLE C3. — *continued*

Variable Number

			1 11 111	1 111222222 2	2222333 333	33 3344 4444	44 44555555555
1	2 3	4 5	67890 12 345	6 789012345	6789012 345	67 8901 2345	67 89012345678
47	49	9 9	12991 11 111	0 00000110 0	0000000 000	00 0000 0000	00 00000000000
48	49	9 9	12991 11 100	0 00000000 0	0000000 000	00 0000 0000	00 00000001100
49	50	9 9	09991 90 000	0 00000000 0	1900000 000	00 0000 0000	00 00000000000
50	51	3 2	13991101 100	0 00000000 0	0000001 700	00 0000 0000	00 00000000000
51	51	3 2	13990 00 000	0 00000000 0	0000000 000	00 0000 0000	00 00000000000
52	53	9 9	08611 11 100	0 00000000 0	0000000 000	00 0000 0000	00 00000000000
53	54	9 9	04211 11 100	0 00000000 0	0000000 000	00 0000 0000	00 00000000000
54	55	9 9	03521 11 111	0 00000001 1	1100000 000	00 0000 0000	00 00000000000
55	56	9 9	09911 11 100	0 00000000 0	0000000 000	00 0000 0000	00 00000000000
56	57	3 9	05721 11 100	0 00000000 0	0000000 000	00 0000 0000	00 00000000000
57	58	8 1	09911 10 000	0 00000110 0	0000000 000	00 0001 1001	10 00000000000
58	59	9 9	03111 11 100	0 00000000 0	0000000 000	00 0000 0000	00 00000000000
59	60	8 1	03520 00 000	0 00000000 0	0000000 000	00 0000 0000	00 00000000000
60	61	6 2	03520 00 000	0 00000000 0	0000000 000	00 0000 0000	00 00000000000
61	62	9 9	05990 00 000	0 00000000 0	0000000 000	00 0000 0000	00 00000000000
62	63	9 9	04911101 100	0 00000000 0	1100000 000	00 0000 0000	00 00000000000
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TABLE C4. DATA FROM BURIALS EXCAVATED BY CONKLIN.

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CONTRIBUTORS

GWENYTH ANN D. COFFIN, Department of Anthropology, State University of New York at Albany, Albany, New York 12222

WILLIAM ENGELBRECHT, Department of Anthropology, State University of New York College at Buffalo, Buffalo, New York 14222

ELEAZER D. HUNT, Department of Anthropology, State University of New York at Buffalo, Buffalo, New York 14261

PHILLIP D. NEUSIUS, Department of Anthropology, Indiana University of Pennsylvania, Indiana, Pennsylvania 15705

SARAH W. NEUSIUS, Department of Anthropology, Indiana University of Pennsylvania, Indiana, Pennsylvania 15705

LYNNE P. SULLIVAN, Anthropological Survey, New York State Museum, Albany, New York 12230

RICHARD G. WILKINSON, Department of Anthropology, State University of New York at Albany, Albany, New York 12222

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